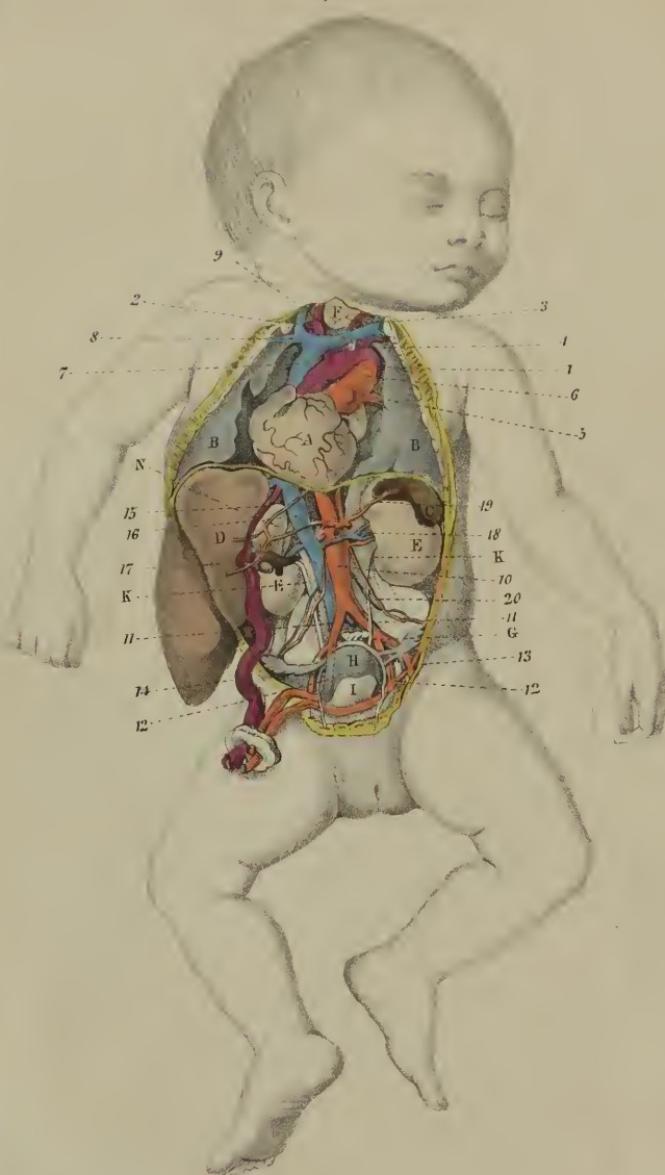




Fig. 51.



See page 220.

A

THEORETICAL AND PRACTICAL TREATISE

ON

MIDWIFERY,

INCLUDING THE

DISEASES OF PREGNANCY AND PARTURITION.

BY

P. CAZEAUX,

ADJUNCT PROFESSOR IN THE FACULTY OF MEDICINE OF PARIS, ETC. ETC.

(ADOPTED BY THE ROYAL COUNCIL OF PUBLIC INSTRUCTION.)

TRANSLATED

FROM THE SECOND FRENCH EDITION, WITH OCCASIONAL NOTES AND A COPIOUS INDEX,

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PHILADELPHIA :
T. K. AND P. G. COLLINS, PRINTERS.

TO

SAMUEL JACKSON, M.D.,

PROFESSOR OF THE INSTITUTES OF MEDICINE IN THE UNIVERSITY OF PENNSYLVANIA, ETC. ETC.

AS A MARK OF RESPECT

FOR HIS

HIGH STANDING AS A TEACHER, AND HIS STERLING WORTH

AS A

PRACTITIONER OF MEDICINE,

AND

AS AN ACKNOWLEDGMENT OF MANY UNSOLICITED FAVORS,

THE

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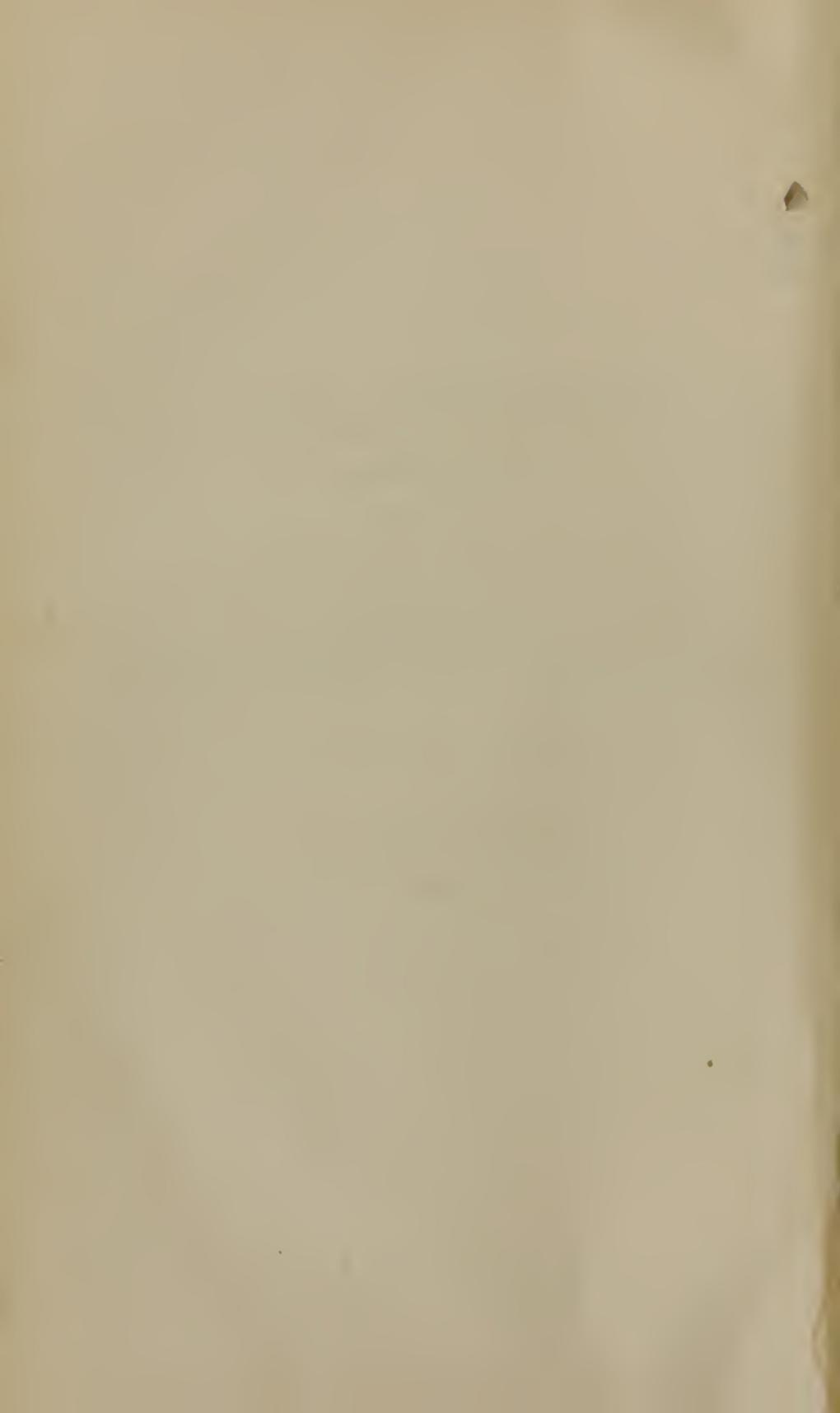
OF

T H I S W O R K

I S R E S P E C T F U L L Y I N S C R I B E D ,

B Y T H E

T R A N S L A T O R .



TO

DOCTOR CHOMEL,

PROFESSOR IN THE FACULTY OF MEDICINE OF PARIS,

P H Y S I C I A N O F T H E H ô T E L D I E U ,

M E M B E R O F T H E R O Y A L A C A D E M Y O F M E D I C I N E ,

C O N S U L T I N G P H Y S I C I A N O F T H E K I N G ,

P H Y S I C I A N O F H E R R O Y A L H I G H N E S S T H E D U C H E S S O F O R L E A N S ,

A N D

O F F I C E R O F T H E L E G I O N O F H O N O R ,

A S A

M A R K O F G R A T I T U D E ,

F O R T H E

M A N Y K I N D N E S S E S H E H A S S H O W N M E ,

P. CAZEAUX.

PREFACE TO THE AMERICAN EDITION.

THE high reputation which the following TREATISE ON MIDWIFERY acquired in France, shortly after the publication of the first edition, and which led to its adoption by the ROYAL COUNCIL OF PUBLIC INSTRUCTION, as early as 1841, has been widely extended by the issue of a second, which contains nearly one-third more matter than the original one; and which, besides the addition of numerous plates illustrative of the mechanism of labour, and of the various phenomena exhibited by the human ovule in its successive transformations, has been remodelled throughout, so that it now embodies the leading principles of obstetrical science, as taught and practiced in that country at the present time.

The chapters devoted to the history of the changes that take place in the ovary and ovulum, both before and after fecundation, have been illustrated by numerous engravings which exhibit the successive stages that each passes through, from the primary appearance of the latter as a microscopic point, to the formation of the corpus luteum in the non-fecundated state; and to the development of the allantois, in that of conception. These figures have been carefully copied by the artist, and I hope, by their aid, the great doctrine of reproduction, which is now exciting so much attention both in this country and in Europe, will be rendered intelligible to every reader. Although the science of physiology is daily making such rapid progress towards final results, and though almost every year is the harbinger of a new theory, yet there are some points connected with the maturation and perfection of the human ovum, upon which most microscopists agree; and those points have been concisely and accurately presented by M. Cazeaux, in the chapters alluded to.

I would also ask attention to the third part of the work, which treats of the mechanism of labour; as I think the doctrines there inculcated are founded in truth and a close observation of nature. For the author has adopted the simple and beautiful classification of M. Nægèle, by which the description of the whole process of delivery is wonderfully simplified, its comprehension is rendered more intelligible, and the indications for manual or instrumental aid, in cases of difficulty or deformity, become more clear and determinate. This classification admits of but five distinct presentations; namely, that of the vertex, of the face, of the breech, and of the right and the left lateral planes; and for each of these presentations two fundamental positions are adopted, one where the presenting part is directed towards the left half of the pelvis, the other where it looks towards its right moiety; and as this presenting part may evidently offer either in front, behind, or at the side of the basin, this system is completed by admitting an anterior, a transverse, and a posterior variety for each of the two fundamental positions—thus making but thirty positions in all—whereas, in Baudelocque's classification, which is generally adopted in this country, there are one hundred and two distinct ones enumerated. Though I must observe that in both systems the same points, or nearly so, are adopted both on the pelvis and the presenting part of the child; so that no confusion can arise with regard to the mechanism. And further, to prevent any possible error from this source, both names are always employed in describing the process, the one given by Baudelocque being included in brackets.

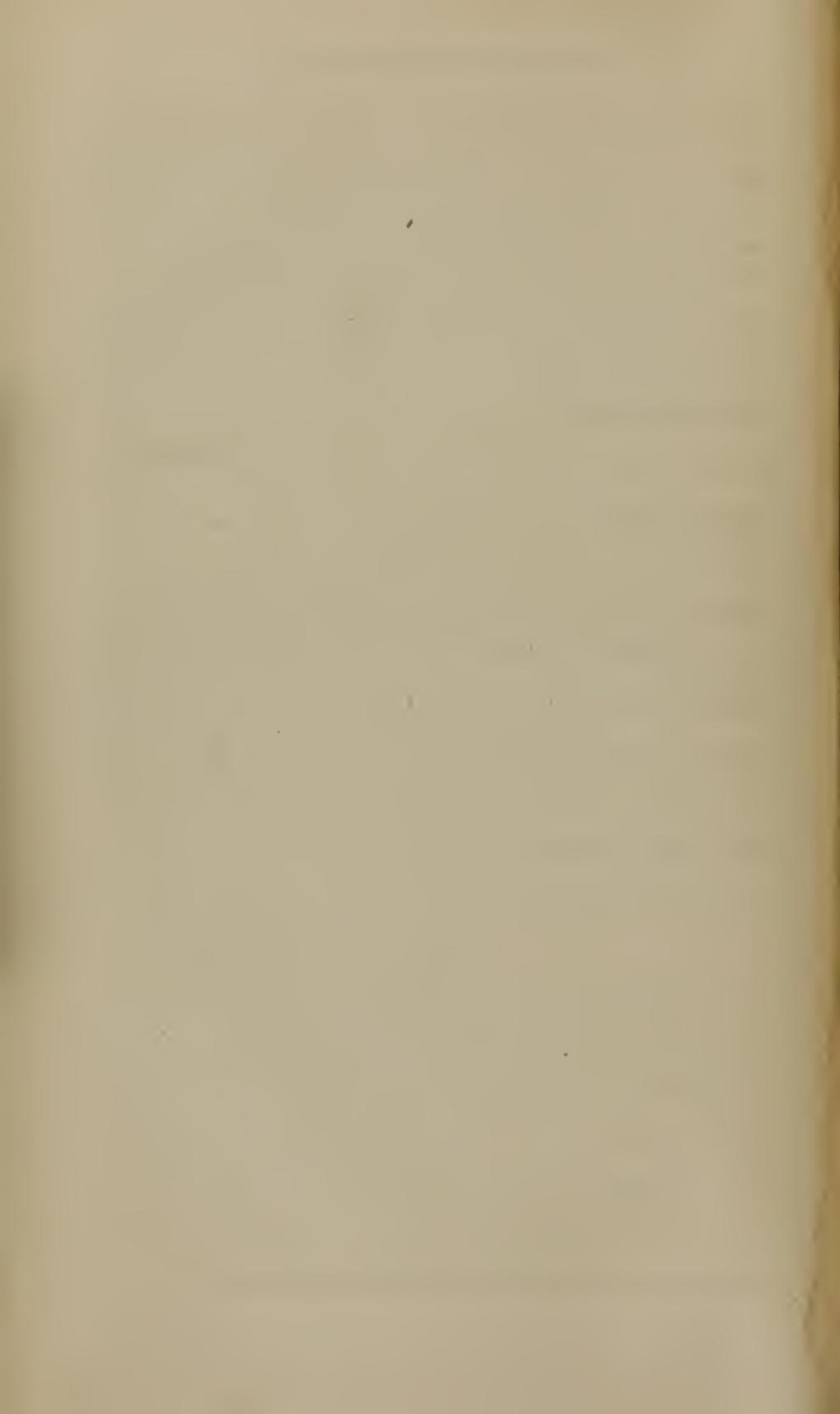
But it is not by mere classification alone that Prof. Cazeaux has simplified our science; for the valuable experience derived from his hospital practice has clearly shown that the unaided powers of nature are quite sufficient to effect the expulsion of the child, in a vast number of those cases which have heretofore been considered as absolutely requiring the intervention of art; and his detailed observations, in the fourth part, on the subject of difficult labours, will afford another, and I trust a convincing proof of the truth of the maxim, **THAT MEDDLESOME MIDWIFERY IS BAD.**

With regard to the translation itself, it may perhaps seem indeli-

cate in me to speak, as the work is about appearing before the public, and every reader will form his own opinion of its merits or defects. But I may be permitted to observe, that I have faithfully endeavored to present the views of M. Cazeaux by an accurate translation; and have rigidly adhered throughout as close to the original as the idioms of the two languages and the rules of common sense would permit. For had I pursued a different course, the author's opinions might have been misrepresented in many instances, and the work would have gone forth bearing his name, but not exhibiting his views.

R. P. THOMAS.

January 26th, 1850.



P R E F A C E.

THE following theoretical and practical treatise on midwifery, is an exposition of the course delivered by me at Paris, during the last eight years. It is more particularly intended for the use of students of medicine and midwife students; although general practitioners may also, perhaps, gain something by its perusal, since I have endeavored to make it a condensed summary of the leading principles established by the masters of our art; and for that purpose have placed in contribution all the works published down to the present day.

From my position in the lying-in hospitals, I have been enabled to ascertain the value of the doctrines put forth by former authors; and I have adopted as true all those which have been confirmed by my daily experience, and have rejected without hesitation all such as were falsified by the numerous cases brought under my own observation, whatever may have been their source, confining myself to quoting without comment those whose value I have been unable to determine. But it is due to truth to state, that I have often been assisted in this appreciation, by the teachings and advice of Professor P. Dubois, whose *Chef de Clinique* I had the honor to be.

Though this work may resemble in its general arrangement most of those published on the same subject in France, yet it differs essentially in the main; for I have adopted almost wholly the views of Professors Nægèle, Stoltz, and P. Dubois, which are not found clearly expressed in any of our classical books. I have also extracted freely from the learned treatise of Professor Velpeau, the vast erudition of which has greatly facilitated my bibliographical researches; from the course of my former teacher, Professor Moreau,

from the excellent articles of Desormeaux, of Dugès, and of Guillemot; from the classical works of England, such as those of Burns, of Campbell, of Merriman, and Rigby; from Dewees; from the productions of Peu, Delamotte, Levret, Smellie, Baudelocque, Gardien, Capuron, etc.; and lastly, it will be seen how highly I value the eminently practical memoirs of Madame Lachapelle. In a word, I have selected, from all sources, whatever bears the impress of truth.

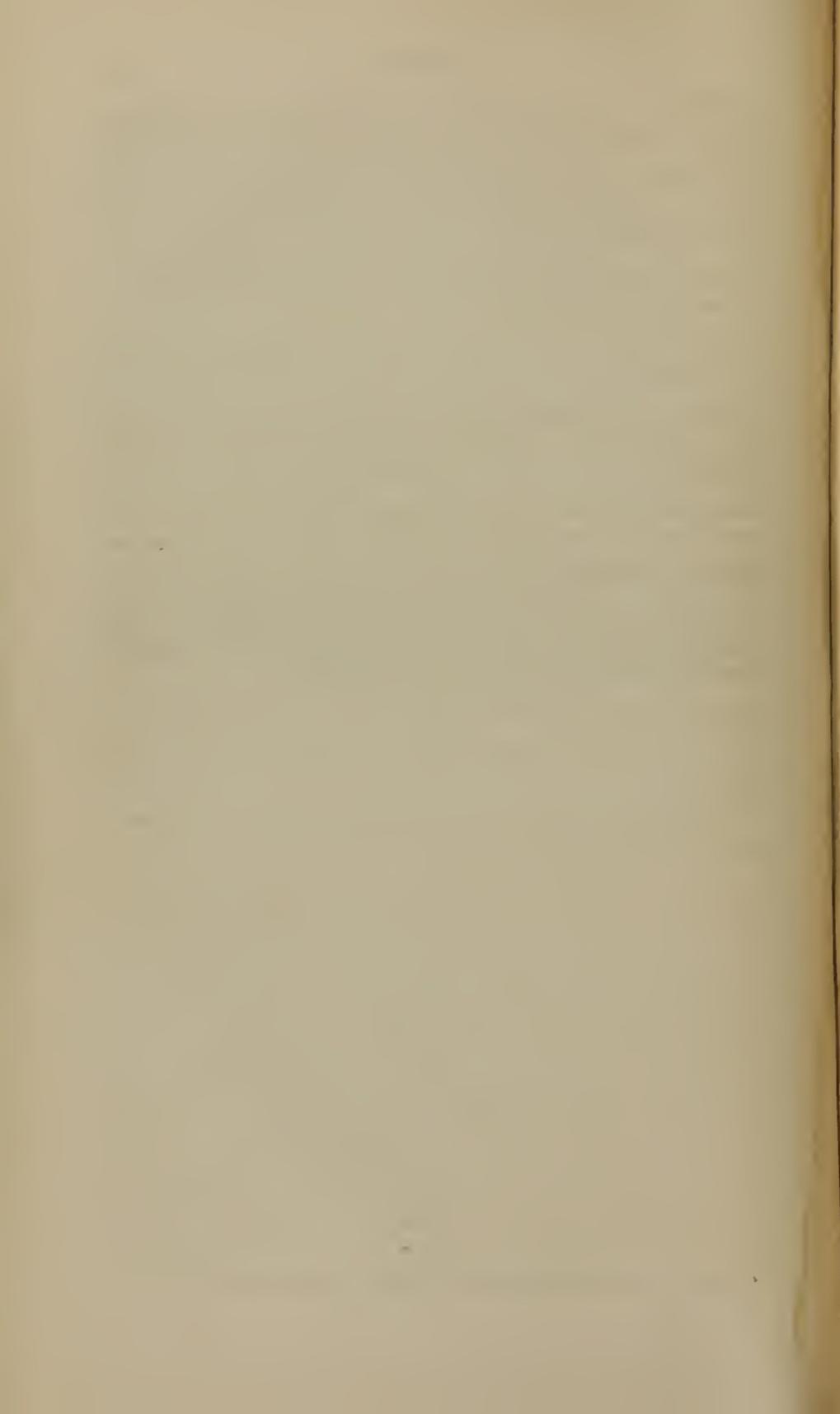
In the sciences of observation, a new work is necessarily enriched by the labors of all antecedent writers; and, therefore, its greatest merit consists in collecting the scattered materials, and forming out of them a body of doctrine, which it illustrates in the clearest and most simple manner possible. Such is the end I have endeavored to attain; and the medical public, and students especially, must judge whether I have succeeded in that attempt.

But few quotations have been made, though their numbers might have been greatly increased; but I wished to avoid the charge made by most students against one of our best classical works. However, I have felt bound to refer to living authors whenever I have introduced a new theory, or any particular procedure, which emanated from them; and besides, as the professorate may be deemed a mode of publicity, I have respected the right to the original ideas which I have heard emitted by Professor Dubois; and his name will be found scrupulously associated with all the opinions emanating from him.

With a view of conforming to the law concerning the new measures, I have only employed the metrical system; and this is the only work which offers that advantage to students. I had at first thought of placing the valuation in the old measures between brackets, but, on reflection, I found the reader would thus have two figures instead of one to retain. Besides, it is so easy and so necessary to become familiar with the new method, that I deemed it useless to overburden the memory of young beginners in that way; more especially as I thought a comparative table, placed at the end of the book, would be quite sufficient to answer every purpose. The indications of the various lengths is not perhaps absolutely exact; since, for the purpose of facilitating their acquisition, I concluded

to make no account of the tenths and hundredths of a millimetre; thus, for example, for the oblique diameter of the superior strait, which by the old measurement was four inches and six lines (French), I have given twelve centimetres instead of 0.1215, as I should have done to be strictly accurate. It is requisite to be aware that these valuations are only approximative, but they will always suffice for the exigencies of practice.

The favorable reception given to the first edition of this work, has induced me to spare no effort to render this worthy of its predecessor. The different parts have received notable ameliorations, and several chapters have been entirely remodelled; and being aided by the counsel of M. Coste, whose learned course has contributed so much to revive among us a taste for ovology, I have greatly extended the study of the human ovum. The additions are otherwise so numerous that this edition contains, in the same volume, one-third more matter than the first; and it might therefore be called a new book, in which I trust will be found collected all our present knowledge relative to the practice of midwifery.



INTRODUCTION.

LABOUR is that function which consists of the natural or artificial expulsion of a viable foetus through the natural parts of generation.

The term expulsion evidently comprises three secondary ideas: namely, that of a body which expels, that of a body which is expelled, and that of an opening or canal through which this expulsion takes place. Hence, we may anticipate to what an extent the structure, the position, the dimensions, and the relations of these different parts, must influence the degree of facility with which this function is accomplished; as also, how greatly a knowledge of this structure, and these relations, would facilitate a comprehension of the forces brought into play by nature for the accomplishment of her work, and that of the mechanism whereby this expulsion is effected.

Consequently, the first part of this book will be devoted to a description of the generative organs of the female; in which, we shall first study the pelvis, and, after having described each of its constituent parts, we shall consider it as a whole; carefully pointing out the peculiarities that its form, direction, or dimensions may offer; and then passing immediately to an anatomical description of the external and internal organs of generation. Most of the leading authors, after describing all these parts in their normal condition, study their vices of conformation, position, etc.; but as this method appears objectionable, we defer the consideration of all those anomalies, that are justly viewed as causes of dystocia, to the division where we treat of the difficult labours. For, by thus bringing together the causes and the effects they produce, we hope to avoid unnecessary repetition, to aid the memories of students, and at the same time to demonstrate more fully the importance of a knowledge of these anomalies.

After having studied the organs of the female in the non-gravid

condition, we shall examine the numerous and important modifications they undergo during gestation; and from this examination we shall deduce the signs of pregnancy, and the therapeutical measures that may be employed for the particular symptoms to which they give rise. The second part will be concluded by studying the primary cause of all these modifications; that is, the foetus and its appendages, which will be severally considered at the different stages of their development.

These preliminary points having been acquired, we shall then be prepared to describe the travail of childbirth, in which two orders of phenomena will be distinguished: the one, being purely physiological, is an expression of the vital actions brought into play for the expulsion of the foetus; while the other is entirely mechanical, and constitutes the mechanism whereby this expulsion takes place. We have devoted much space to the description, and more particularly to an explanation of the mechanism of natural labour; and we hope to have succeeded in explaining certain facts connected therewith, that have hitherto only been pointed out.

In the fourth part, which is devoted to the management of difficult labours, we shall enumerate in detail the causes of dystocia, the mode of action of each, the signs by which their existence may be recognized, the indications for treatment they present, and the means of remedying them.

Finally, in the fifth and last part, we shall study the delivery of the after-birth. Like the accouchement, this is usually simple and natural, but it may be complicated by numerous difficulties and accidents that require the intervention of our art; and hence, in order to fill up properly the design we have traced out, it will be necessary to treat in detail of the natural, the artificial, and the complicated delivery of the after-birth.

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A

TREATISE ON MIDWIFERY.

PART I.

OF THE ORGANS OF THE FEMALE CONCERNED IN GENERATION.

THE study of the organs of the female concerned in generation, comprises both the parts destined to the formation of the ovule, those for the reception and expulsion of the infant, and those forming the canal through which this expulsion takes place. The pelvis, and the soft parts which line it, constitute the latter; the ovaries, Fallopian tubes, uterus, vagina, and the external parts, compose the former.

CHAPTER I.

OF THE PELVIS.

THE basin (in Latin, *pelvis*,) is a large, irregular, osseous cavity; a species of curved canal, which terminates the trunk inferiorly, and sustains this latter by its posterior part. It is placed directly upon the inferior extremities, which afford it points of support, and to which, in the erect position, it transmits the weight of the superior portions of the body. Its position in an adult of the ordinary height is, in general, about the central part of the whole trunk. In the infant at term, and more especially during the intra-uterine life, it is much below this point; and at a certain period of foetal existence, when the lower extremities are so embryonic as merely to resemble little nipples, it even occupies the inferior portion of the body.

Moreover, the accoucheur should study the pelvis in its totality, and in its relations with the great function to which it is destined. Now, as the best means of understanding a whole is to decompose it, and study separately its constituent parts, we shall proceed at once to the individual consideration of the bones that enter into the formation of the basin.

ARTICLE I.

The bones that constitute the pelvis are the sacrum, the coccyx (both of which are placed behind and on the median line), and the ossa innominata, or coxal bones. These last are in pairs; being situated upon the sides, and articulating with each other in front.

§ 1. OF THE SACRUM.

This is a symmetrical, triangular bone, which is curved forward at its lower part, and is placed at the posterior part of the pelvis, where it appears like a wedge, forced in between the two ossa innominata, immediately below the vertebral column and directly above the coccyx. It is traversed longitudinally by the sacral canal (a continuation of the vertebral canal), and, relatively to the axis of the body, it is directed from above downwards, and from before backwards; hence the column represented by it forms an obtuse angle with the lumbar vertebra, being salient in front, and receding behind. This point is called the promontory, or the sacro-vertebral angle. Besides this direction, the sacrum is curved upon itself from behind forwards, so as to present an anterior concavity, the hollow of the sacrum: this curvature is generally much more marked in the female than in the male.

Anatomists describe the bone as having two faces, two borders, a base, and an apex.

1. The *spinal*, or *posterior face*, is convex, rough, and very irregular, presenting on the median line three, four, or five prominences, the longest of which are above, and continuous with the ridge formed by the series of spinous processes of the vertebra; lower down, the sacral canal is terminated as a triangular gutter, being bounded laterally by two tubercles called the *cornua* of the sacrum; upon each side of, and close to the median line, a large furrow exists, at the bottom of which the four posterior sacral foramina are seen, communicating with the vertebral canal, and serving to transmit the nerves of the same name. Outside of these foramina we find a series of elevations, apparently analogous to the transverse processes of the vertebrae; and above them two irregular fossæ, into which the posterior sacro-iliac ligaments are inserted.

2. The *pelvic*, or *anterior face*, is smooth and concave, and is traversed by four prominent transverse lines, the remnants of the sutures between the different pieces that composed the bone in early infancy, and which serve to separate some superficial, transverse, and quadrilateral grooves found there, from each other. Sometimes

the first is so well marked, as to be mistaken, when practising the touch, for the sacro-vertebral angle.

The anterior sacral foramina, four in number, are found nearer the lateral margins, communicating with the sacral canal, and serving to transmit the anterior branches of the nerves of a similar name. Beyond the foramina is an unequal surface for the attachment of the pyramidal muscles.

3. The *borders* of the sacrum may be divided into two portions. 1. The superior, being very thick, presents, on its anterior half, a semi-lunar articular facet for joining with the coxal bone, and on its posterior part an excavation, and some rough projections for the attachment of the sacro-iliac ligaments. The other or inferior portion, is quite thin, in fact almost cutting, and is occupied by the insertion of the sacro-sciatic ligaments.

4. The *base* is directed upwardly and a little in front, and has its greatest diameter transversely. An oval facet, more or less inclined backwards, surmounts it at the middle, whereby the bone is articulated with the last lumbar vertebra. Upon each side is seen a smooth surface which is concave transversely, and convex from before backwards. This surface inclines forwards, and is continuous with the iliac fossæ, being covered, in the recent subject, by the anterior sacro-iliac ligaments. It is separated from the anterior face of the sacrum by a rounded border that constitutes, as we shall hereafter learn, the posterior part of the superior strait. The two surfaces constitute the *wings of the sacrum*. Behind, the upper orifice of the sacral canal, and the two articular processes of the first piece of this bone, are found.

5. The *apex* of the sacrum is directed downwards, and a little backwards; presenting an oval facet for the articulation of the coccyx.

6. The *sacral canal*, hollowed out in the thickness of the bone, is the termination of the vertebral canal; being triangular and broad superiorly, it becomes narrow and flattened at its inferior part, where it degenerates into a gutter, that is converted into a complete canal by the ligaments. This lodges the sacral nerves, and communicates both with the anterior and the posterior sacral foramina.

The sacrum, although quite thick, is a very light and spongy bone. Besides, it is pierced by a great number of foramina, and traversed by a central cavity, which serve to diminish its weight still more.

Its *development* is analogous to that of the vertebræ, and takes place from thirty-four or thirty-five points of ossification, arranged in the following manner:—

1. Five of them, placed one over the other, occupy the anterior and middle parts.
2. In each of the inter-spaces which separate these, two small osseous laminæ are developed some time after birth, which seem to form their articular surfaces.
3. Ten are situated in front and upon each side of the latter, that is, one for each lateral portion of the four or five primitive bones.
4. And behind them six others are developed, between which:
5. There appear three or four that correspond with the spinous processes, or their

laminae; and, 6. Lastly, there is one upon each side above the iliac surface, for the auricular facet.

§ 2. THE COCCYX.

This name is given to an assemblage of three or four, occasionally five little bones, united with each other on the median line of the body by fibro-cartilages, and apparently suspended at the point of the sacrum, of which, indeed, they appear to be only a movable appendage, continuing its line of curvature forwards.

M. Cruveilhier declares that he has known it, in some cases, to form a right angle or even an acute one with the sacrum. Being thus formed, the coccyx constitutes, as a whole, a triangular and symmetrical bone.

1. Its *spinal*, or *posterior face*, is convex and irregular, and is only separated from the skin by the posterior sacro-coccygeal ligament.

2. Its *pelvic*, or *anterior face*, is smooth and slightly concave, and lies in contact with the termination of the rectum, which rests upon it. Like the preceding bone, it is marked by certain transverse grooves, corresponding with the intervals which had, for a long period, separated its different pieces.

3. Its two lateral borders are quite irregular, and are occupied by the attachments of the anterior sacro-sciatic ligaments, and the ischio-coccygeal muscles.

4. Its slightly concave base presents, above, an oval surface, that articulates with the apex of the sacrum, and behind, two little tubercles called the *cornua* of the coccyx.

5. The *apex* is rounded, irregular, and sometimes bifurcated, affording attachment to the levator ani muscle.

The coccyx is developed from four or five centres of ossification, that is, one for each of its parts.

§ 3. THE COXAL BONE, HAUNCH BONE, OR OS INNOMINATUM.

This is a non-symmetrical, quadrilateral bone, curved upon itself, as if twisted in two different directions, contracted in its middle, and of a very irregular figure. The pair occupy the lateral and anterior parts of the pelvis. It presents an internal and an external face, and four borders, for our consideration.

1. The *external*, or *femoral surface*, is turned outwards, backwards, and downwards, at its superior part, whilst inferiorly, it looks forwards.

At its superior and posterior portion is seen an unequal, narrow, and convex surface, affording origin to the gluteus maximus muscle, and terminated below by a slightly elevated circular ridge, called the *superior curved line*. Beneath this, there is a larger surface, which is concave behind, narrowed in front for the insertion of the gluteus medius muscle, and bounded by a slight ridge below, called the *inferior curved line*; still lower, there is a third extensive and convex surface, serving for the attachment of the gluteus minimus muscle. The whole of this portion of the femoral face just, described,

forms a large fossa, alternately concave and convex, bearing the name of the *external iliac fossa*.

Towards the front, the external face presents the cotyloid cavity, or the acetabulum, at its superior part, and a little more in advance and below, the sub-pubic, or *obturator foramen*. This opening is triangular, with rounded angles; its long diameter is inclined downwards and outwards, and its circumference is sharp and irregular, presenting above a groove, oblique in its direction from behind forwards and from without inwards, through which the obturator vessels and nerves pass out. A fibrous membrane that subtends the foramen is attached to its periphery, except in the immediate vicinity of the groove.

Upon the inner side of the obturator foramen, between it and the median line, there is a concave or nearly plane surface for the origin of several muscles.

2. The *abdominal*, or *internal face*, is directed forwards at its upper part, and backwards at the lower. It may be divided into two portions; the superior of which is characterized by a large excavation, called the *internal iliac fossa*, by a semilunar articular surface found just behind this fossa, and called the *auricular facet*, and still more posteriorly, by some rugosities, that are analogous to those found on the articular faces of the sacrum.

The superior portion is terminated below by a large, rounded, and concave line, that separates this from the other moiety. The latter, or inferior portion, presents behind a nearly triangular plane surface, which corresponds to the cotyloid cavity and to the body of the ischium; near its middle, we find the obturator foramen, and in front the internal face of the pubis and of the ischio-pubic ramus.

3. *Borders*. These are four in number. The posterior one has a very irregular shape, being oblique from above downwards, and from without inwards. The *posterior superior spinous process* is found at its junction with the superior border. This prominent, well-marked eminence is separated by a rough margin from another though less voluminous one, called the *posterior inferior spinous process*.

Below this last apophysis, the student will observe a very deep notch, which contributes to the formation of the great sciatic foramen, and is terminated below by a triangular, pointed projection bearing the title of the *spine of the ischium*. This process is more or less prominent in different individuals, and is sometimes directed inwards. A groove is seen just beneath it, in which the tendon of the obturator internus muscle plays; this groove is a part of the *lesser sciatic notch*; and lastly, this border terminates at the tuberosity of the ischium.

The anterior border is concave, oblique above, and nearly horizontal in front. The *anterior superior spinous process* is formed by its union with the superior border. A considerable depression exists under this apophysis, which separates it from another one, called the *anterior inferior spinous process*. Then we find a groove just under this elevation, for the gliding of the conjoint tendon of the

psoas magnus and the iliacus internus muscles; which groove is bounded, in front and below, by the ilio-pectineal eminence. And lastly, the border is terminated by a triangular horizontal surface (which is directed downwards and forwards, and is broader externally than internally), and by the spine and angle of the pubis.

The superior border or crest of the ilium is thick, convex, and inclined outwards, excepting at its posterior part, where it looks slightly inwards—being twisted, in its course, somewhat like an italic *f*. Anatomists have subdivided it into the external and internal lips, and the intervening space. The anterior superior spinous process bounds it in front, and the posterior superior one behind.

The inferior border is shorter than either of the others; it presents, however, three parts for study. There is an oval surface above, for articulating with its fellow of the opposite side, forming the symphysis; below, it is terminated by the tuberosity of the ischium, and in the middle, we find the ischio-pubic ramus; this is a sharp ridge, formed superiorly by the descending branch of the pubis, and inferiorly by the ascending portion of the ischium.

The coxal bone is developed from three principal centres of ossification, which appear at the same time, in the iliac fossa, the tuberosity of the ischium, and in the pubis. Owing to this mode of growth, it has been customary to divide the *os innominatum* into three portions: the superior one (called the *ilium*) forms, in a great measure, the contour and prominence of the hip; the *pubis*, being anterior, supports the genital organs; and the inferior one, which sustains the body when seated, is named the *ischium*.

Several years after birth, an osseous lamina, resting upon the superior border of the bone, is developed to form the iliac crest, whilst a similar layer embraces the tuberosity of the ischium, and extends to its ramus; at the same time, a third centre of ossification appears for the anterior inferior spinous process of the ilium, and a fourth forms the angle of the pubis.

ARTICLE II.

ARTICULATIONS OF THE PELVIS.

These are five in number; namely, one in front for the pubes, two behind for the iliac bones and sacrum, and those of the coccyx with the sacrum, and the latter with the spine.

Three of these articulations have also received the name of symphyses; for instance, the term *symphysis pubis* has been applied to the articulation between the two bones of the pubis, and that of *sacroiliac symphyses*, to those of the sacrum with the ilium.

§ 1. SYMPHYSIS OF THE PUBIS.

This articulation is formed by the approximation of the oval surfaces that occupy the upper part of the coxal bone's inferior border. These surfaces are slightly convex and uneven, and are covered by

a cartilaginous lamina which fills up the inequalities. The convex shape, and the direction of their faces are such that they only come into contact for an inconsiderable extent at their internal or posterior part, and hence they leave above, in front, and below an open space, which is the more considerable, in proportion to the distance from the centre of the joint. The articulating surface of the two cartilages is a little facet, about six to eight lines in its vertical diameter, by two to three in its transverse one. This facet is smooth, and furnished with a synovial membrane, which is the more lubricated with synovia as the female approaches the period of labour.

A considerable thickness of the inter-pubic ligament fills up the interval that exists between the other points of these articular surfaces. In fact, the thickness of this ligament is very great, particularly above, a little less in front, much less behind, and finally becomes suddenly more marked below, where this fibrous body spreads out and takes the name of the triangular or *sub-pubic* ligament. Behind the articulation, the fibro-cartilaginous substance forms a species of raised pad, occupying the middle of the symphysis only, whilst above and below, it disappears.

Two other ligaments strengthen this articulation: the triangular, or sub-pubic one, just spoken of, and the anterior pubic ligament. The latter is an irregular fibrous plane, interlacing partly with the aponeurosis of the abdominal muscles, partly with the periosteum of the pubis. It is apparently formed by several superposed layers, all of which pass in front of the articulation. The most deep-seated of these are transverse, and unite in their course with the inter-pubic fibro-cartilaginous lamina.

§ 2. SACRO-ILLIAC SYMPHYSIS.

This articulation is formed by the union of the semilunar facets, that have been pointed out in describing the border of the sacrum, and the internal face of the ossa ilia. The articular surface of the sacrum alone, is covered with a thick diarthrodial cartilage, that of the ilium being deprived of it altogether, as asserted by M. Velpeau. Most of the classic authors, however, describe a very thin one upon this face. It is sometimes possible to distinguish between these articular surfaces a certain quantity of a soft yellowish substance, quite different from synovia, and scattered in isolated flakes.* Its character is but little understood.

These bones are held together by the following ligaments:—

1. The posterior, or great sacro-sciatic ligament, is found at the posterior inferior part of the pelvis. It is triangular, thin, flattened, and narrower in the middle than at the extremities: it arises by a large base from the posterior inferior spinous process of the ilium, the sacro-spinous ligament, the last of the posterior tubercles of the sacrum, and from the inferior part of the margin of this bone and

* According to M. Cruveilhier, a synovial membrane supplies this articulation. It is difficult to demonstrate in the adult, but is manifest in infancy, and in the female during gestation.

border of the coccyx, and running outwards, downwards, and a little forwards, is inserted into the tuberosity of the ischium. Its fibres are arranged in such a way, that the internal ones cross the external about their middle.

2. The lesser sacro-sciatic ligament is smaller than the preceding, though nearly of the same form, and situated more in front. Within, it is broad, being partially confounded with the other, but arising a little more anteriorly upon the sides of the sacrum and coccyx; thence, it passes forwards and outwards to be inserted into the spine of the ischium.

The sacro-sciatic ligaments convert the two sciatic notches into foramina. They not only serve to unite the sacrum to the ilium, but also contribute to the formation of the parietes of the pelvis.

3. The posterior sacro-iliac ligament is a collection of yellow, elastic, fibrous bundles, intermixed with fatty pellets, that fill up the rough excavation observed behind the cartilaginous surfaces; very short, numerous, and interlacing in every direction, they become almost intimately blended with the sacrum and coxal bones. On account of their strength, they greatly consolidate this articulation.

4. The anterior sacro-iliac ligament is a simple fibrous lamina, extended transversely from the sacrum to the os innominatum. It is rather an expansion of the periosteum of the pelvis than a true ligament.

5. The superior sacro-iliac ligament is a very thick fasciculus, passing transversely from the base of the sacrum to the coxal bone.

6. The inferior sacro-iliac ligament (vertical sacro-iliac of M. Cruveilhier) arises from the posterior superior spinous process of the ilium, and is inserted just below the third sacral foramen, into the tubercle found at the termination of the sacrum's border; and behind, into the great sacro-sciatic ligament.

§ 3. SACRO-COCCYGEAL SYMPHYSIS.

This articulation closely resembles that between the bodies of the vertebræ. It is formed by the oval facet at the apex of the sacrum, and the base of the coccyx. Two ligaments, and a fibro-cartilage, retain these surfaces in contact, namely:—

1. The anterior sacro-coccygeal ligament, consisting of a few parallel fibres that descend from the anterior part of the sacrum to the corresponding face of the coccyx.

2. The posterior sacro-coccygeal ligament is flat, triangular, broader superiorly than below, and of a dark color. Having arisen above, from the margin of the inferior orifice of the sacral canal, it descends to, and is lost upon, the whole posterior surface of the coccyx. It also aids in completing this canal behind.

3. An inter-articular fibro-cartilage, similar to those of the vertebræ, is placed between the two convex surfaces, and an analogous one unites the different pieces that constitute the coccyx with each other; but this disappears when ossification is completed. This latter circumstance rarely happens in females till advanced age.

These articulations are also movable in them, permitting motion backwards and forwards, or even laterally.

Again, it is worthy of notice, that the sacro-coccygeal joint becomes ossified sooner, and more frequently, than the first piece of the coccyx with the second: the third and fourth bones early become fused.

The reader will now understand that it is possible, from the great mobility of the sacro-coccygeal articulation, for a luxation to take place during labour, and that, when the joint has become ankylosed, there may be a fracture, or a forcible separation of the fused bones.

Until quite recently, it had been supposed that the pubic and sacro-iliac articulations, in the unimpregnated condition, were wholly immovable; but it is now generally admitted, that they have a degree of mobility, especially in certain violent bodily actions.

During gestation, the ligaments that enter into their composition are saturated with fluids, swell up, and become softened, so that the motion of the articular surfaces is very evident. This ramollissement is very considerable in some cases, and may render walking, or even standing, altogether impossible. (*Vide Diseases of Pregnancy.*)

§ 4. SACRO-VERTEBRAL ARTICULATION.

This is produced by the junction of the sacrum with the fifth lumbar vertebra. It takes place at three different points: viz., between the oval facet seen at the middle of the sacrum's base, and the inferior surface of the body of the last vertebra; and, at the two articular surfaces found near the entrance of the sacral canal.

The modes of connection are, a fibro-cartilage (which is much thicker in front than behind), the termination of the two anterior and posterior vertebral ligaments, the inter-spinous ligament, and lastly, the sacro-vertebral ligament, a short, very strong, fibrous bundle, which descends obliquely from the anterior inferior part of the transverse process of the last vertebra, downwards and outwards, towards the base of the sacrum where it is inserted.

Further, a synovial membrane is found in the articulation between the oblique processes of the sacrum and those of the vertebræ.

To these must also be added the ilio-lumbar ligament, which passes from the apex of the transverse process of the fifth lumbar vertebra to the thickest portion of the iliac crest; and the ilio-vertebral ligament, formed of two fibrous bands, the superior of which arises from the middle and lateral part of the body of the last lumbar vertebra, and the inferior, from the inter-sacro-vertebral space, and both are then spread out on the coxal bone.

The obturator membrane still claims a description, in order to finish the history of the ligamentous apparatus of the pelvis. This, as has been remarked by M. Cruveilhier, like the sacro-sciatic ligaments already spoken of, is more of an aponeurosis, serving to complete the pelvic walls, than a true ligament.

These resisting membranes are probably intended to diminish, in the hour of labour, the compression of the mother's soft parts, included between the infant's head and the osseous parietes of the

basin, as also to favor, by their elasticity, the passage of the head through the pelvic excavation.

The obturator membrane subtends the foramen thyroidcum, excepting at its superior part, where an opening exists, which converts the groove, intended for the passage of the obturator vessels and nerves, into a complete canal. Being inserted by its external semi-circumference into the corresponding part of the periphery of the obturator foramen, it is attached by its internal half to the posterior face of the ascending ramus of the ischium. Its surfaces afford origins for the two obturator muscles. This membrane is composed of aponeurotic fasciculi, that cross each other in every direction. (*Cruveilhier.*)

ARTICLE III.

OF THE PELVIS IN GENERAL.

Studied in its general aspect, the basin represents a cone, slightly flattened from before backwards; the base of which, being above, is at the same time inclined forwards, whilst the apex is directed downwards and a little backwards.

§ 1. EXTERNAL SURFACE OF THE PELVIS.

Anatomists have divided this surface into four regions: the anterior of which exhibits, on the median line, the front part of the symphysis pubis, next (passing outwards) is a smooth surface from which several muscles of the thigh arise, then the external obturator fossa, occupied in the recent subject by the muscle of the same name.

The posterior, bounded by the hinder part of the iliac crest, presents, on the median line, the ridge of the sacral spinous processes, the inferior opening of the vertebral canal, the union of the sacrum with the coccyx, and the posterior face of this latter bone.

The ten posterior sacral foramina, transmitting the nerves of the same name, are found in two deep gutters, on the sides. These grooves prolong the spinal gutters, and are occupied in the recent state by the commencement of the sacro-spinal muscles. The lateral regions may each be divided into two parts: one, the superior, is composed of the external iliac fossa; the other, or inferior, offers, behind, the posterior aspect of the sacro-sciatic ligaments, and the plane of the notches or foramina bearing the same name; and in front, the cotyloid cavity.

§ 2. INTERNAL SURFACE.

The internal surface or cavity of the pelvis has been aptly compared to the basin of the ancient barbers. In fact, like those vessels, it has a superior part, which spreads out freely, and is called the great, the superior, or the abdominal pelvis; and an inferior

one, more contracted, bearing the title of the little pelvis, or pelvic excavation.

1. The *great pelvis* has a very irregular figure, and forms a species of pavilion to the entrance of the basin. Its walls are three in number: the anterior one is deficient in the dried skeleton, but in the living state it is supplied by the anterior abdominal muscles; its posterior parietes exhibit a notch in its middle, that is ordinarily filled up by the projection of the last lumbar vertebrae which are usually left in connection with the pelvis, although in reality not forming any part of it. Two gutters are found on the sides of this eminence, occupied by the psoæ muscles; further outwards, the anterior part of the sacro-iliac symphyses appear, which constitute the boundaries between the posterior and lateral regions: these latter are constituted by the internal iliac fossæ, covered by the iliacus internus muscles.

2. The *lesser pelvis*, or *basin*. This forms a curved canal, larger in the middle than at its extremities, and slightly bent forward. If all the parts described as appertaining to the great pelvis be removed by the saw, as recommended by Chaussier, a species of ring will remain, whose circumference, being narrow in front and much broader behind, will furnish a correct idea of the shape of the pelvis. Four regions are found in this cavity also:—

The anterior one, is concave transversely, and is inclined upwards, having the posterior part of the pubic articulation near its middle: this is generally prominent, assuming the form of a longitudinal pad. Towards the sides, a smooth surface appears, and then the internal obturator, or sub-pubic fossa, having, at its upper external part the inner orifice of the sub-pubic canal, through which the external obturator vessels and nerves pass out from the pelvis.

It is not at all uncommon for females to complain during labour of severe cramps in the muscles of the upper internal part of one thigh. These pains result from the pressure made by the child's head upon those nerves, as it glides over this portion of the excavation.

The posterior region—constituted by the front face of the sacrum and coccyx—is directed downwards, and is concave from above, downwards. It consequently exhibits those peculiarities already noticed when describing the sacrum.

The lateral regions present two quite distinct portions: the anterior one is wholly osseous, corresponding to the back part of the cotoyloid cavity, and to the body and tuberosity of the ischium. It is directed from above downwards, from behind forwards, and from without inwards.

The posterior one is formed by the internal face of the greater and lesser sacro-sciatic ligaments, and by the internal aspect of the great and small sciatic notches, converted by them into foramina; it has an opposite direction (to the former). One of these foramina is larger and situated higher up than the other, and is of an oval form. The other is triangular, smaller, and more inferior. The pyramidal muscle, the great sciatic nerve, gluteal artery, and the internal pudic vessels and nerves, escape from the pelvis through

the great sciatic foramen. The small sciatic hole is filled up by the obturator internus muscle, and the internal pudic vessels and nerves, which re-enter the pelvis in order to supply the perineum.

If two vertical sections be made, the one extending on the median line through the sacrum and the pubis, dividing the basin into two lateral halves, and the other at right angles to the first, dividing it into anterior and posterior moieties, four equal parts or quarters of the pelvis will be thereby produced, which accoucheurs have designated under the names of the *anterior* and *posterior inclined planes*. Desormeaux included the lateral regions of the excavation only (which he divided into two equal parts) in the composition of these planes: according to him, the anterior inclined planes are continuous with the anterior region; the posterior, with the front face of the sacrum; and the spine of the ischium is found at the point of union of these two. The direction of the inclined planes is always the same, whatever may be the manner in which they are formed. That is, the anterior are directed from without inwards, from above downwards, and from behind forwards; the posterior, from without inwards, from above downwards, and from before backwards—in a word, in such a way as to resemble somewhat the four sides of a lozenge which is slightly curved in its length. According to most authors, these inclined planes are supposed to play an important part in the mechanism of labour, and they imagine that their direction has an immediate influence upon the movements which the head of the foetus performs in the excavation.

In anticipating that the description of the mechanism of labour hereafter given will invalidate this assertion, we shall simply observe that the movements of rotation executed by the head, take place more frequently when the latter, by strongly arching out the perineum, is so far below the inclined planes as scarcely to feel the influence of their direction, and further, that these motions often occur in a line inverse to this direction.

The great and the lesser pelvis are separated from each other by a kind of horizontal circle, which has been designated by accoucheurs as the abdominal, or *superior strait*, the isthmus, or margin of the basin. Finally, the apex of the pelvis presents an opening that is limited by a circle, partly osseous, partly ligamentous, to which the name of the *inferior strait* has been applied. Consequently, these two straits are the extreme limits of the pelvic excavation.

§ 3. OF THE SUPERIOR STRAIT.

This is formed, behind, by the sacro-vertebral angle, and the anterior border of the wings of the sacrum; outwardly, by the rounded margin that bounds the internal iliac fossa below; and in front, by the superior edge of the pubis, terminating at the symphysis of this bone. The abdominal strait has been variously compared to an ellipse, an oval, and to the heart of a playing card. We may assert, however, with Chaussier, that its shape is that of a curvilinear triangle, the angles of which have been rounded off, and having its base behind and the apex in front.

It constitutes the entrance to the lesser pelvis, and, therefore, the first part of the narrow canal which the foetus has to traverse. Hence, the pains taken by accoucheurs to study this osseous opening can readily be conceived.

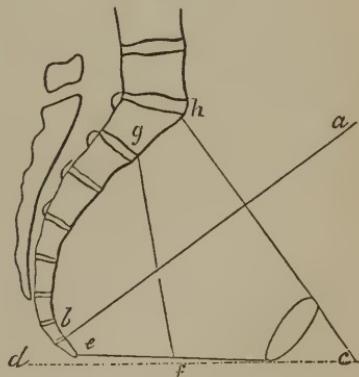
All the modern authors since the days of Deventer, have endeavoured to fix precisely the degree of inclination of its plane and axis, to ascertain the direction the foetus should follow in engaging in the pelvic canal, and to determine carefully the dimensions of the latter, and their accordance with those of the body, which must pass through it.

The plane of the superior strait is inclined obliquely from above downwards, and from behind forwards; but writers are far from being unanimous in regard to the degree of its inclination; that is, in determining the angle formed by the sacro-pubic line, at the point where it meets a horizontal one, drawn from the superior part of the symphysis pubis towards one of the points on the anterior face of the sacrum. Although originally placed at 45° by J. J. Muller (1745), this angle has successively been fixed at 35° by Levret; at 75° by Camper, and at 55° by Saxtorph; and still more recently, Professor Nægèle, after a great number of researches, has concluded to consider it as an angle of 60° (1819). It is now generally admitted that the degree of inclination in the plane of the superior strait is from 55° to 60° in the erect position of the female.

The direction of the plane being once understood, it is an easy matter to ascertain that of its axis; for the latter being a line which falls perpendicularly upon the centre of this plane, it must evidently form with the vertical the same angle that the plane itself does with the horizontal line, and consequently must have just the same degree of inclination. Being thus comprised, the axis of the superior strait is a line (*a b*, Fig. 1) which, commencing near the umbilicus of the female, would pass directly through the centre of this strait, and fall upon the point of union of the upper two-thirds of the coccyx, with its inferior third. Hence, it will be directed from above downwards, and from before backwards. Further, the inclination of this plane varies according to the woman's position. Thus, it is less in the recumbent one, less when she is bent forward, and also less in the ordinary condition, than in the period of gestation.

The inclination increases towards the end of pregnancy, especially when the female leans backwards in order to establish her equilibrium.

Fig. 1.

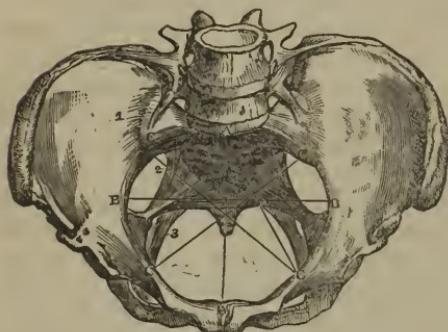


c h. The plane of the superior strait prolonged beyond the pubis. *c e.* The plane of the inferior strait prolonged beyond the pubis. *c d.* Shows the departure of this plane from the horizontal line. *a b.* The axis of the superior strait. *g f.* The axis of the inferior strait.

As the figure which represents the circumference of the superior strait is not a perfect circle, its dimensions, taken at different points, are, of course, unequal, and, accordingly, writers have admitted several diameters for it, thus:—

There are three principal ones (Fig. 2), namely, an antero-posterior, or sacro-pubic diameter *a a*,

Fig. 2.



a a. The antero-posterior, or sacro-pubic diameter. *b b.* The transverse diameter. *c c.* The two oblique diameters. *a c.* The sacro-cotyloid interval.

the ilio-pectineal eminence of the opposite side; this is found on both sides, and is four and three-quarter inches long.

Lastly, M. Velpeau admits a fourth diameter, called by him the sacro-cotyloidean; before described, however, by Burns, under the more exact name of the sacro-cotyloid interval, *a c*, existing between the promontory and the posterior part of the cotyloid cavity. This interval, according to the examinations of the French surgeon, is from four to four and one-eighth inches in extent; but from the results of Nægèle and Stoltz's researches it is much less, being scarcely three and a half inches (the mean obtained from ninety pelvises). The circumference of this strait varies from thirteen to seventeen inches; Levret taught, that it equalled one-fourth of the female's height; but to establish such an approximation, the development of the pelvis should always be in direct proportion to the stature of the individual, which is certainly not the fact.

§ 4. OF THE INFERIOR STRAIT.

The inferior strait—the perineal strait—or apex of the pelvis (as it is variously called), is more irregular in shape than the superior one. Its outline presents, in fact, three tuberosities or osseous projections, separated by as many deep notches.

If, however, the advice of Chaussier be followed, and a sheet of paper be placed over this opening, so as to trace its outline with a crayon, it will be found to have an oval figure, the smaller extremity of which is in front, and the larger one, looking backwards, is broken in upon by the prominence of the coccyx. This point, disappearing at the moment of the head's passage, offers no obstacle to the de-

livery; and, therefore, the strait may be considered as nearly an oval.

The periphery of the pelvis at its apex is formed by the inferior part of the symphysis pubis—the descending branch of this bone—the ascending branch and tuberosity of the ischium—the inferior margin of the great sacro-sciatic ligament, and by the border and point of the coccyx. Hence, three triangular eminences are found in it; the two ischia upon the sides, and the coccyx behind. The first two are immovable, but the last, on the contrary, is effaced at the period of delivery, as just mentioned; for the mobility of the sacro-coccygeal articulation allows the coccyx to be pushed downwards and backwards by the foetal head, as it traverses the inferior strait. The two lateral prominences, made by the tuberosities of the ischia, are placed on a plane somewhat lower than the point of the coccyx; and, consequently, in the sitting posture, the weight of the body rests solely on those tuberosities, and not at all upon the coccygeal extremity. This circumstance furnishes us a reason why transverse contractions of the pelvis are far more frequent at the inferior strait than the antero-posterior ones.

The three notches also require a passing notice; thus, the two postero-lateral ones are very deep, but when the sciatic ligaments have been preserved, they are comparatively superficial; the third is found anteriorly; its apex corresponds to the inferior part of the symphysis pubis, its base to a line drawn between the anterior parts of the tuberosities of the ischia, and its sides are formed by the ischio-pubial rami. The term *arch of the pubis* has been applied to this notch. The columns of the arch are distorted outwardly, as if a rounded body had been forcibly expelled from the pelvis, whilst the bones were soft, and had pushed them before it; and this arrangement, which is more marked in the female than the male, favors the descent of the head. The arch is three and a half to three and three-quarter inches broad at the base; but only one and a quarter to one and a half inches at its apex; in height, it is about two, to two and a quarter inches. Hence the area of the inferior strait will not present a uniform plane (should it be desirable to ascertain the irregularities it exhibits), because all parts of its margin are not upon the same level. However, to obviate the difficulty met with, in determining the direction of this plane, Dugès has divided the strait into two nearly equal portions, the one anterior, and the other posterior, meeting at the tuberosities of the ischium, and each presenting a distinct plane and axis; but as this method of proceeding uselessly complicates the question, we prefer considering the terminal plane of the pubis, as represented by the coccy-pubial line, thus leaving out the lateral projections altogether.

The question is then reduced to these terms: What is the direction of the line that extends from the point of the coccyx to the inferior part of the symphysis pubis?

Writers, likewise, variously describe this; for instance, according to the majority of the French accoucheurs, the plane of the inferior

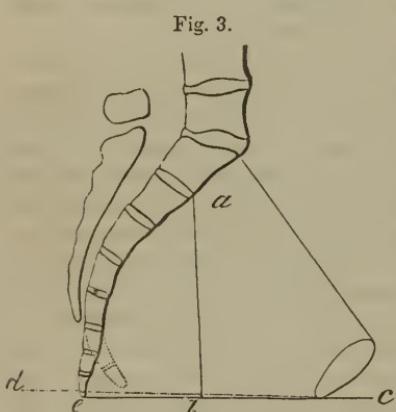
strait is slightly oblique, from below upwards, and from behind forwards, so that it would unite with that of the superior strait (if prolonged) in front of the symphysis pubis. On the other hand, M. Nægèle concludes, from his numerous researches, that the inclination of the antero-posterior diameter of this strait is from 10° to 11° from the horizon, and that the point of the coccyx is found, as a mean, from a half to three quarters of an inch higher than the summit of the pubic arch; and, therefore, the coccy-pubal line is a little oblique from above downwards, and from behind forwards. As a further result of his labors, he has found that, in five hundred well-formed persons, of different statures, four hundred and fifty-four have the point of the coccyx more elevated than the inferior portion of the symphysis; in twenty-six it was lower, and in twenty individuals both points were on the same level. M. Velpeau remarks, as we think with some reason, that, at the moment of delivery—the only time, after all, when it is requisite to form an idea of the direction of this plane—the point of the coccyx, being pushed downwards

and backwards by the passage of the head, is at least on a level, if not lower than the inferior part of the symphysis.

The assertion of M. Nægèle, therefore, although true as applied to the female not in labour, fails during parturition; and it must be admitted that the plane of the inferior strait is then oblique, from below upwards, and from behind forwards.

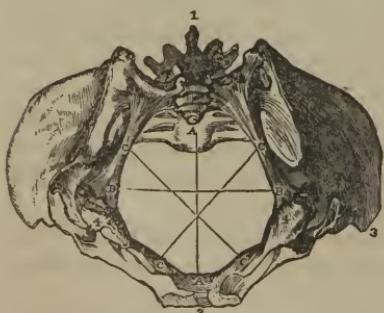
The axis of this strait is represented by a line (*a b*, Fig. 3) directed from above downwards, and from behind forwards, which, starting from the first piece of the sacrum, falls at a right angle upon the middle of the bis-ischiatic space. The remarks made upon the variations in the direction of the plane, apply with equal force to its axis. The latter crosses the axis of the superior strait in the excavation, forming with it an obtuse angle, the sine of which is in front.

It is also very important to know the dimensions of the perineal strait, and hence obstetricians describe three principal diameters at that point, namely—
 1. The antero-posterior or



c d. The horizontal line. *c e.* The plane of the inferior strait (during labour). *a b.* The axis of the inferior strait.

Fig. 4.



a a. The antero-posterior or coccy-pubal diameter. *b b.* The transverse or bis-ischiatic diameter. *c c.* The two oblique diameters.

coccy-pubal diameter (*a a*, Fig. 4), running from the point of the coccyx to the summit of the pubic arch; it is usually four and a quarter inches long, but may increase to four and three-quarter inches during labour, by the retrocession of the coccyx. 2. The bis-ischiatic, or transverse diameter, *b b*, is four and a quarter inches in length, and goes from one tuberosity of the ischium to the other. 3. The oblique diameter, *c c*, commences at the middle of the great sacro-sciatic ligament, and crosses to the point of union of the ascending branch of the ischium, with the descending ramus of the pubis, and is four and a quarter inches long, but may become one quarter of an inch more during labour, from the elasticity of these ligaments.

All the diameters of the inferior strait are therefore about four and a quarter inches in length.

§ 5. OF THE EXCAVATION.

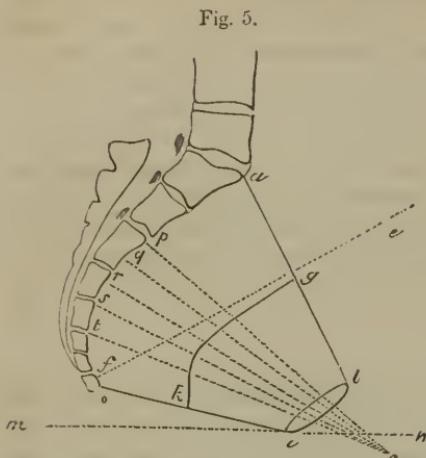
The excavation is that space comprised between the superior and the inferior straits, and it is in this cavity that the foetal head executes its principal movements; and it is somewhat surprising that, until quite recently, this canal was scarcely mentioned in the majority of the classic works, notwithstanding the importance of a knowledge of its dimensions, as also of the direction of its plane and axis.

Its dimensions comprise both the height and width at the different points; thus the height in front, is one and a half inches; upon the sides, three and three-quarter inches; whilst it is four and a quarter inches behind, if a straight line be drawn from the sacro-vertebral angle to the point of the coccyx, and five inches and a quarter, following the curve of the sacrum.

Three diameters are also described for this cavity (like the straits), so as to appreciate its extent in the different directions. All of them are taken at the centre of the excavation, and they consist of an antero-posterior one, of four and three-quarters to five and one-eighth inches in length, a transverse diameter four and three-quarter inches long, and an oblique one, of the same length; consequently, all the diameters of this cavity are very nearly four and three-quarter inches each.

If the canal forming the excavation were a cylinder, it would only be necessary to divide it by a plane, perpendicular to its walls, in order to represent the opening of this cavity, but a simple division, thus made, would not give a just conception of the excavation, for two reasons: first, the canal is not cylindrical, because its sides are not parallel, and the anterior face of the sacrum presents a well-marked curvature; the pubic wall being nearly straight, and the lateral parietes very oblique from without inwards, and from above downwards. Consequently, to furnish an exact idea of the general arrangement of the pelvic excavation, it seems necessary to divide the canal (vide Fig. 5) by a series of planes, all passing from the point *c* (the point of intersection of the superior and inferior straits) to any point whatever, *p q r s t* on

the anterior face of the sacrum. Each of these planes will show the opening of the pelvic cavity at the level where it is found. Now, to determine, with certainty, the direction of the general axis of this excavation, it is requisite to raise a perpendicular line from the geometrical centre of each of these sections, and to draw a line *g k* through the base of each.



a b. The plane of the superior strait. *i d.* The plane of the inferior strait. *e.* The point where these two planes would meet, if prolonged. *m n.* The horizontal line. *e f.* The axis of the superior strait. *g k.* The axis of the excavation. *p q r s t.* Various points taken on the sacrum to show the plane of the excavation at each point.

the inferior straits; hence, this curve exactly represents the whole axis of the pelvis, or, in other words, the line which the foetus must follow in traversing the pelvic excavation.

We have considered the line, representing the total axis of the pelvis (perhaps incorrectly), as a simple curve; for M. Nægèle has well observed, that it cannot be composed of two straight lines, as often taught, nor is it a simple arc of a circle. In fact, the anterior face of the bodies of the first two bones of the sacrum forms a straight line; the sacral curve embracing only the last three bones. Consequently, the central line, which is evidently parallel to this, will consist of a straight and a curved portion—straight, for that part of the excavation corresponding to the two superior vertebrae, and curved in the space, which is bounded behind by the last three sacral vertebrae, and in front by the anterior pelvic walls.

§ 6. BASE OF THE PELVIS.

The base of the cone, represented by the pelvis, has its circumference directed upwards and in front; it exhibits behind, a notch, into the bottom of which the base of the sacrum projects, and which is further filled up by the last lumbar vertebrae (generally left *in situ* to complete the posterior wall of the greater pelvis) by the ilio-lumbar ligaments, and by the quadratus lumborum muscles; 2, outwardly, the anterior two-thirds of the iliac crest furnishing attachments to the external and the internal oblique and transversalis abdominis muscles; and 3, in front, the anterior superior and

This line *g k* (which, as the student will observe, is not straight) is called the general axis of the pelvis.

It is now readily understood that this line is nearly parallel to the anterior face of the sacrum, and its extremities correspond with the axes of the superior and

inferior spinous processes of the ilium, the groove for the passage of the conjoint muscles—the psoas magnus and iliacus internus, the ilio-pectineal eminence, the superior border of the horizontal branch of the pubis, the spine, and lastly, the upper margin of the symphysis of this bone.

§ 7. DIFFERENCES OF THE PELVIS.

1. According to the *sex*. Considered as a whole, the pelvis in the male is smaller but deeper, the bones are thicker, and the muscular character more marked, than in the female. The superior strait being more retracted, resembles the figure of a heart on a playing card. The excavation is not so wide, though it is deeper, especially in front, owing to the greater length of the symphysis pubis; the arch of the pubis is straight, nearly triangular in its shape, and is not widened in front. The coccyx is early joined to the sacrum, and the articulations of the pelvis are much sooner ankylosed than in the female. In the latter, we may add, that the iliac fossæ are larger and more warped outwardly (whence the prominence of the haunch bones), and the iliac crest less twisted in the form of an italic *f*; the interval that separates the angle of the pubis from the cotyloid cavity is more considerable, causing, in part, the projection of the great trochanters, and a wider separation of the femurs; the superior strait is larger and more elliptical; the curve of the sacrum deeper and more regular; the tuberosities of the ischium more removed; the pubic symphysis shorter; the foramen thyroideum more triangular; the arch of the pubis broader, more rounded, and more curved, and the lateral borders, formed by the ischiopubic ramus, more contorted outwardly.

2. According to the *age*. At birth, the pelvis is extremely narrow and elongated, and of such inconsiderable dimensions, that its cavity will not contain several of the organs afterwards found in it; from which circumstance, the protuberance of the belly, observed in the foetus and in children at term, in a great measure results; the excavation has the form of a cone, the abdominal strait being strongly inclined downwards; the sacrum is nearly flat, and so much elevated that a horizontal line drawn from the superior part of the pubis would pass beneath the coccyx; the coxal bones are narrow, elongated, and nearly straight at their superior part, and the iliac crests, from being cartilaginous, are not twisted.

From this disposition, it necessarily happens that the greatest diameter of the pelvis extends from the sacrum to the pubis. Burns declares that this form changes by degrees as the little girl advances in age: thus, the—

	At 9 years.	At 10 years.	At 13 years.	At 14 years.	At 18 years.
Antero posterior diameter measures	2 $\frac{1}{2}$ inches	3 $\frac{1}{4}$ inches	3 $\frac{1}{2}$ inches	3 $\frac{3}{4}$ inches	3 $\frac{7}{8}$ inches
Transverse do.	2 $\frac{1}{4}$ "	3 in. 5 lines	3 $\frac{3}{4}$ "	4 "	4 $\frac{1}{2}$ "

§ 8. USES OF THE PELVIS.

The pelvis constitutes the base of the trunk, and according to Desormeaux it forms a complete ring, that may be reduced to two arches; the posterior and superior of which receives the whole weight of the trunk, whilst the anterior and inferior one serves as a buttress to it.

The two lower extremities are attached to the lateral parts of this circle, and support, in the erect posture, all the weight of the superior part of the body. This use of the pelvis satisfactorily explains to the accoucheur the vicious forms the cavity often assumes when ossification is retarded, or whenever any disease alters and softens the bones.

Another function of the basin is to enclose and protect the bladder, rectum, and seminal vesicles of the male; the uterus, Fallopian tubes, and ovaries in the female. During gestation, it sustains the womb, and gives a proper direction to this organ; and in labour, it affords a passage to the child.

ARTICLE IV.

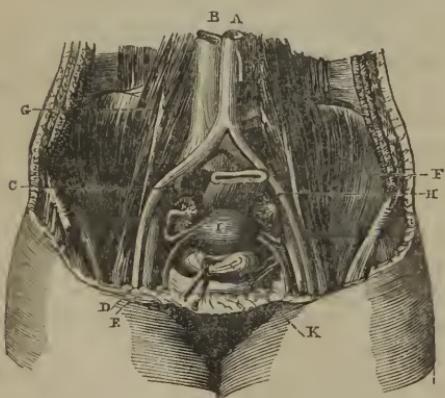
OF THE PELVIS, COVERED BY THE SOFT PARTS.

It will not suffice to study the pelvis as found in the skeleton alone, for the changes produced in its form and dimensions in the living female, by the arrangement of the soft parts, also require our special attention.

Being continuous above with the abdomen, the great pelvis encloses and supports the mass of the intestines, and affords points of attachment, by its walls, to two orders of muscles: the one, destined to form the periphery of the abdomen, fills the large opening exhibited in front; and the others, two in number, are placed in the iliac fossæ; these are the iliocaudatus internus, and the psoas magnus muscles, which, from being situated on the lateral parts of the abdominal strait, change both its shape and size. The first of these has radiated fibres, and occupies the iliac fossæ; the second descends from the sides of the lumbar vertebræ, and, after

Fig. 6.

Pelvis, with the soft parts seen from above



A. A section of the aorta. B. The vena cava inferior. C. The internal iliac artery, arising together with D, the external iliac, from the primitive iliac trunk. E. External iliac vein. F. The iliocaudatus internus. G. The psoas magnus muscles. H. The rectum. I. The uterus with its appendages. K. The bladder, the fundus of which is depressed so as to bring the womb into view.

having been joined to the preceding, is inserted into the lesser trochanter of the thigh bone. These two muscles, surrounded by their aponeuroses, may be regarded as a sort of cushion, forming a convenient support to the developed uterus, and destined to protect it by the elasticity of the soft parts against the shocks and concussions momentarily produced by locomotion. Notwithstanding the presence of these muscles, the strait still resembles a curvilinear triangle in shape, the base, however, of the triangle being in front instead of behind, as it was in the dried pelvis; the transverse diameter is diminished half an inch by their presence; the antero-posterior one is, perhaps, a little abridged by the thickness of the vesical walls, uterus, and soft parts that line the posterior face of the symphysis and anterior surface of the sacrum, and the oblique diameters alone remain unchanged; the location of the rectum, however, on the left, retracts slightly the corresponding diameter.

The modification of the transverse diameter, produced by the psoas muscles, is always much less when these are in a state of relaxation from the flexure of the thighs. Finally, as Baudelocque has remarked, the bis-iliac diameter is diminished in length, in proportion to the thickness of these muscles, and the antero-posterior one being more contracted, the strait assumes a more elliptical, or rounded form. Besides these, there are two muscles found on each side of the excavation, covering the obturator and ischiatic foramina; namely, the obturator internus, and the pyramidales. Flammé attributes the movements of rotation, executed by the head in the pelvis, to the action of these muscles; but the same reasons that caused us to reject the influence of the inclined planes on this process, equally deter us from entertaining the opinion of the Professor of Strasbourg. The pelvic cavity is still further diminished by the rectum, bladder, and cellular tissue; more especially when the latter is loaded with fat. Consequently, the foetal head descends with more difficulty in very corpulent women than in others.

The perineal strait, although open in the dried skeleton, is here occupied by a species of a contractile concave partition, which sustains the viscera of the pelvic and abdominal cavities. This floor is composed of two muscular planes; the interior of which, formed by the levator ani and coccygeal muscles, is concave above; and the other, having its concavity below, is constituted by the sphincter ani, the transversus perinei, the ischio-caavernous, and the constrictor vaginalis muscles. The internal pudic vessels and nerves, a large amount of cellular tissue, the skin, the pelvic aponeurosis, and an inter-muscular aponeurosis complete this floor; which, in the hour of labour, ought to become thin and distended, but which occasionally offers such an obstacle to the spontaneous delivery of the foetus as to require the intervention of art.

The extent of the perineum, in its ordinary condition, is three inches, namely; from the point of the coccyx to the anus, there are one and three-quarter inches, and from the anus to the vulva, one and one-quarter inches, but, at the instant of the head's passage through the vulvar fissure it becomes so distended, that the in-

terval separating the anterior commissure from the coccyx, is from four to four and three-quarter inches in extent. It must now be evident that the terminal outlet of the pelvic canal, in the basin, covered with its soft parts, is not at the point of the coccyx, but rather at the anterior commissure of the perineum; in fact, the latter is so greatly distended in the last moments of labour, that its anterior border goes beyond the inferior part of the symphysis pubis, thereby prolonging very considerably the posterior wall of the pelvic excavation, and, as a consequence, the canal to be traversed by the foetus. Wherefore, the direction in which the head is ultimately disengaged is not represented by the axis of the inferior strait, but by that of a plane which may be drawn from the lower part of that symphysis to the anterior commissure of the distended perineum.

Hence, in order to form an exact idea of the line traversed by the fetus, from its entrance in the superior strait until its final exit from the vulva, it will be necessary to continue the operation already pursued upon the anterior face of the sacrum (vide page 41) over the curve represented by the anterior face of the distended perineum; that is, to make a series of planes from the point *c* (Fig. 5) to the divers parts of the perineal curve; and, from the centre of each, raise a perpendicular, so as to form by their union a complete axis; the upper extremity of which is the axis of the superior strait; the middle part, a curved line, having its concavity anterior and its convexity parallel to the front face of the saerum and perineum; and the inferior extremity is directed from before backwards, and from above downwards.

CHAPTER II.

OF THE ORGANS OF GENERATION.

THE genital apparatus of the female is much more complicated than that of the male, and is composed both of organs situated in the interior of the pelvis, and of parts attached to its exterior. The ovaries, Fallopian tubes, uterus, and vagina compose the first, and the mons veneris, vulva, and perineum are included in the second.

SECTION I.

OF THE EXTERNAL PARTS OF GENERATION.

These consist of the mons veneris, vulva, and perineum.

ART. I.—MONS VENERIS.

The mons veneris is a rounded eminence, a species of *relief*, more

or less prominent according to the embonpoint of the individual, situated in front of the pubis, and surmounting the vulva; this eminence is partly produced by the bones, and partly by the subcutaneous adipose tissue; the skin covering it is very thick and clastic, but being little extensible, it cannot aid in the enlargement of the vulva, as asserted by M. Moreau, at the period of delivery. In the adult female, it is covered by hair, and contains a great number of sebaceous follicles.

ART. II.—VULVA.

The vulva is an opening, or longitudinal fissure, situated on the median line at the base of the trunk; being bounded in front by the mons veneris, behind by the perineum, and laterally by the external labia.

We shall comprise in its description, as properly appertaining thereto, all the parts included between the labia majora.

1. These latter, or the *labia externa*, are two cutaneous folds, flattened transversely, and thicker in front than behind, which bound the opening of the vulva externally; commencing at the mons veneris, they gradually recede from each other, as they pass backwards, nearly to their middle, then they again approach, so as to unite at the posterior extremity, and form there a bridle or commissure called the *fourchette*. This latter is generally lacerated during the first labour.

The labia externa present an external or cutaneous surface, which is covered with hairs after puberty; and an internal one, moist, smooth, of a rose color, and formed by a mucous membrane that is provided with a considerable quantity of mucous follicles.

In young girls, the external lips are somewhat thicker above, and approach each other closely; but, on the contrary, in females who have borne children they are separated, and lose their regularity.

They consist of a cutaneous and a mucous layer, between which a great quantity of adipose tissue, a stratum of dartous tissue, some arterial, venous, and lymphatic vessels and nerves are found.

2. The *nymphæ*, or *labia interna*, are brought into view, by separating the external lips, under the form of two mucous folds, resembling the comb of a young cock. Contracted behind, where they are continuous with the internal face of the labia externa, they spread out in front as they converge towards each other. These lips scarcely descend to the middle of the external ones, but they mount up in front as high as the clitoris, where they bifurcate; the inferior branch of this bifurcation is lost in the clitoris; but the other surmounts it, joins its fellow of the opposite side, and forms above this body a little fold in the shape of a hood, called the *prepuce of the clitoris*. At birth, the nymphæ project beyond the external lips, but at puberty, they are concealed by the latter. Again, they become visible in child-bearing women; rather, however, by the separation of the labia majora than by their own prominence.

Further, their dimensions are very variable in different individuals, and in various climates; thus, in certain countries of Africa, they

are very long, and constitute the famous *apron* of the Hottentots. Besides, as Velpeau has remarked, these parts are so extensible that, under the influence of continual tractions, they may become very much elongated. I have met with a young girl, in my own practice, who was afflicted with an excessive itching at the vulva at the commencement of her pregnancy. To relieve this, she was in the habit of scratching continually, and in her impatience dragged on the right nymphæ, and, in less than a fortnight, this latter was twice as long as its fellow.

The internal lips are furnished with a cryptous apparatus, visible to the naked eye, which is the seat of an abundant sebaceous secretion, that occasionally becomes very irritating.*

3. *The Clitoris.*—Under this name, a little erectile tubercle, resembling the corpus cavernosum of the male (except in volume), is described. Its free extremity appears at the front part of the

* M. Robert has latterly called the attention of anatomo-pathologists to a great number of mucous follicles spread over the surface of the vestibule, especially around the meatus urinarius and the vaginal entrance, where they open by exceedingly small orifices. Ramifying under the mucous membrane, they pursue a variable course, and terminate in a manifestly enlarged cul-de-sac.

The majority of them are simple; but some exhibit small lateral branchings, likewise terminating in cul-de-sacs, and seeming to establish, by this branching disposition, a transition between a follicle properly so called, and the secretory organs of a more elevated character.

When studied in detail, these follicles, according to M. Robert, may be divided into several groups. Thus:—

1st. Some (seven or eight in number) are found in the vestibule; they are quite small, simple, superficial, and running in different directions. 2d. Others, less numerous though more important, and having a considerable volume, open on the surface of the median tubercle that forms the inferior boundary of the orifice of the meatus urinarius; they run parallel to the urethra, being placed under the mucous membrane of this, canal, or in the thickness of its spongy tissue. I have seen some of them penetrate to the depth of six lines, and have frequently observed the branching disposition already figured and described by De Graef. 3d. There are several small and superficial ones on the sides of the meatus urinarius and at some distance from it, the orifices of which unite at the bottom of a remarkable conical depression. 4th. Lastly, the most numerous and interesting of all are placed on the sides of the vaginal orifice in the groove formed by the union of the hymen and its debris with the mucous membrane of the vulva.

Two of them, being larger and more constant than the others, open towards the extremities of the transverse diameter of the vaginal entrance. Being uniform in their direction downwards and backwards under the mucous membrane, they are often nearly three-fourths of an inch in depth.

Haller has observed them in some subjects traversing nearly the whole depth of the perineum, and extending almost to the rectum. Being formed by a very delicate, vascular, and sensitive mucous membrane, these organs secrete a limpid, alkaline, and viscous fluid, which spreads itself over the vulva, and lubricates the surface. This secretion, although inconsiderable in amount during the repose of the genital organs, increases greatly under the excitement of the venereal orgasm. They likewise participate in the periodical changes of the genital apparatus; thus they are only slightly developed in infancy and old age, but exhibit numerous varieties in the adult female, connected doubtless with those of the constitution itself. During pregnancy, a remarkable development and a secretory activity is exhibited, under the influence of the congestion experienced by all the pelvic organs, in that state; and, finally, they are found quite voluminous in most women who have had several children.—Robert, *Arch. Gén. de Méd.*, August, 1841.

vulva, about half an inch behind the anterior commissure of the labia externa, and its body is attached by two crura to the ischio-pubic rami; these roots ascend, converging and increasing in size, to the level of the symphysis, where they unite to form a single cavernous body, flattened on its sides, which, after a course of two or three lines in front of the symphysis, detaches itself, then curves forward so as to present a convexity above and in front, whilst it becomes more and more slender towards the free extremity, called the *glans clitoridis*.

During the first months of intra-uterine life it is difficult to make out the distinction of the sexes, because the clitoris is as long as the penis; even in the earlier years of existence its dimensions are quite considerable, but after this period it ceases to grow, and, in some females, apparently diminishes. Again, in certain rare cases, it acquires a great length; for instance, M. Cruveilhier has seen one whose free extremity measured two inches, and a case is on record where it reached four and a quarter to five inches. Most of the pretended hermaphrodites may be referred to anomalies of this kind. The clitoris, like the penis, has a suspensory ligament, and an erector muscle; the canal of the urethra in the female, passes between the two branches of the cavernous body, like it does in the male.

In its intimate structure, the clitoris consists of erectile tissue; and hence, the blood determined there during coition, swells it up and causes an erection. This organ, according to most authors, is the principal seat of voluptuousness in the female.

4. The *vestibule* is a small triangular space placed at the superior part of the vulva. It is bounded above by the clitoris, below by the urethra, and laterally by the nymphæ.

5. The *Urethra*.—The meatus urinarius is situated just below the vestibule, at about an inch from the clitoris, and immediately above the prominent enlargement of the anterior part of the vagina. The terminating orifice is usually more contracted than the canal, but the tubercle, or enlargement just alluded to, enables us to sound females without uncovering them, for it is only necessary to recognize it by the finger in order to direct the instrument properly. In my estimation, the following is the most simple method of introducing the catheter without uncovering the patient: I first introduce my finger into the orifice of the vagina, and rest its palmar face against the anterior vaginal wall; I then slide the instrument along this palmar face until it is arrested by the fold already alluded to, then I depress the extremity so as to elevate the point of the instrument one or two lines, and, in the majority of cases, the canal is easily entered in this manner.

The difficulties experienced in sounding pregnant women will be treated of hereafter (article *Pregnancy*).

The urethra, a continuation of the meatus urinarius, just described, varies in the female from one, to one and a half inches in length. It is large, conical, and slightly curved. Its inferior portion is confounded with, or at least intimately united to, the ante-

rior vaginal wall, and its anterior parietes, separated in front from the pubis by some cellular tissue only, is located on a level with the symphysis, under the junction of the two crura of the clitoris.

The canal of the urethra is muscular and erectile in structure, having a thick lamina of muscular fibres, which seem to be a continuation of those of the bladder, and a similar one of spongy tissue lying subjacent to the mucous membrane.

Occasionally, this canal is enormously dilated. Flamand met with a case that permitted the introduction of a finger, and Meyer, with another, which eventually admitted of coition !

6. *The Hymen.*—The irregular opening of the vagina is found beneath the meatus urinarius ; this is of variable dimensions after coition, and in females who have had children ; but in virgins, it is provided with a membrane by which the orifice is diminished. This membrane is the *hymen*, a species of diaphragm, interposed between the internal organs and the external genital apparatus and the urinary passages. It resembles a crescent in shape, the concavity being anterior ; sometimes, the horns of the crescent are prolonged enough to join each other, thus forming a complete circle, perforated in the centre ; its free margin is thin and concave ; the convex one is continuous with the membrane of the vagina or vulva, and as this blocks up the posterior and lateral parts of the vagina, a notable difference will exist in the extent of the orifice, dependent upon the greater or less size of the hymen.

In some instances, the hymen is a complete imperforate membrane, and although usually thin, transparent, and very fragile, it is occasionally found thick and resisting. As it is only composed of a fold of mucous membrane, containing between its laminæ a few vessels and some areolar tissue, this body is generally ruptured at the first sexual approaches, and its debris constitute two or three little tubercles, bearing the name of the *carunculae myrtiformes*.

The above, however, is not the uniform law ; and the differences in shape, under this head, have been reduced by M. Velpeau to the following varieties : 1. In the semi-circular species, the hymen may form such a narrow and solid fold as to permit copulation without being ruptured. 2. The concave border of this same variety approaches more or less towards the urethra, in such a way as to contract the vagina behind, and hence it almost always gives way in coition. 3. In the circular division, the free border is much thinner than the other, often being fringed, as it were, and leaving an opening which is sometimes round, sometimes slightly elongated, though in general situated somewhat nearer to the anterior than the posterior wall of the vagina. 4. Again, we find a disk or complete diaphragm, that is ordinarily pierced by a number of small holes like those of a watering-pot, and at other times is without the least aperture. 5. In some instances a species of bridle, or a small cord attached under the urethra, or on the concave border of the hymen, supplants both the valve and the circle. 6. Lastly, a second hymen occasionally exists above the first.

This membrane is regarded as the seal of virginity; and yet, as just shown, it is often found after a fecundation; and on the other hand, numerous causes besides coition may destroy it.

7. The *carunculae myrtiformes* are some little tubercles, two to five in number, found in females only, which appear to be the debris of the ruptured hymen; the two most anterior ones, according to certain physiologists, appertain to the median columns of the vagina. In consequence of oft-repeated friction, these caruncles may inflame, degenerate, and even become the source of an abundant purulent discharge, and have been mistaken under such circumstances for syphilitic vegetations, and the patient has been subjected to an anti-venereal treatment, which, at least, was useless. Personal cleanliness, and some of the vegeto-mineral lotions are usually sufficient to cause their disappearance. M. Velpeau has resorted, however, in some cases, to excision.

8. *Fossa Navicularis*.—This is a little depression of half an inch only in extent, at the outside, bounded behind by the fourchette, and in front by the convex border of the hymen. It, like the fourchette, formed as before stated by the junction of the inferior extremities of the labia majora, mostly disappears after the accouche-ment.

ART. III.—PERINEUM.

9. The perineum is a sort of membranous bridge, scarcely an inch to an inch and a half long, which separates the vulva from the anus; its inferior plane is composed of the skin. But, for a more full description of the parts entering into its structure, I must refer to the treatises on anatomy (*vide art. Pelvis*).

SECTION II.

OF THE INTERNAL PARTS.

The internal parts of generation are the vagina, and the uterus, together with its appendages, the Fallopian tubes, and ovaries.

ART. I.—OF THE VAGINA.

The vagina, or vulvo-uterine canal, is a cylindrical membranous tube, extending from the vulva to the uterus; it is situated in the pelvic excavation between the bladder and rectum; extending from the vulva to the superior strait, it has of course the same direction as the general axis of the pelvis; that is, it forms a curve, the concavity of which is anterior; the walls are soft and yielding, flattened from before backwards, and their surfaces are contiguous, and its length varies from four and a quarter to five and a quarter inches; though, according to Professor Velpeau (*Leçons Orales*), it is much less than has been generally imagined, or than he himself has pointed out in his works, being hardly two and a quarter to two and three

quarter inches long. Although this remark may be true, if the length be measured in the dead subject, where the soft flabby walls of the

Fig. 7.

A vertical section of the pelvis, showing the organs *in situ*.



B. The bladder is seen in front, with its urethra passing out under the symphysis. Just behind it, the uterus v, and the vagina v, are observed to occupy the middle of the excavation; the rectum r, is still more posteriorly, being separated from the vagina by the recto-vaginal septum p. The perineum.

By reference to the upper part of the figure, the peritoneum can be traced from the anterior abdominal walls to the fundus vesice, then down between the bladder and womb, forming a pouch, next over the fundus uteri, and then between the womb and rectum, forming another pouch, and finally to the posterior abdominal wall.

vagina easily yield under their own weight and that of the uterus, and in consequence, the vertical extent of this cavity does not exceed three or three and a half inches; yet, the elasticity of these walls will permit the introduction of a speculum five or six inches long, and when the uterus is raised completely above the superior strait, the estimate of the Professor of La Charité is certainly below the truth.

The vagina's length varies in different females; thus, for instance, the negress has a longer and more spacious one than the European, as a general rule. Professor Chomel informed me that he had frequently remarked this fact, and I have since had occasion to verify its truth; nor is the vagina uniform in its size, in all parts of its extent; for the inferior orifice is the most contracted, the superior extremity is the largest, whilst the middle part, especially in women who have had many children, frequently exhibits a considerable spreading out. The walls apparently retract in aged females, and greatly diminish the area of its cavity, returning very nearly to the same dimensions as are found in young girls.

This canal is sometimes very short, reduced even to one and a half or two inches; but this congenital brevity must not be con-

founded with the apparent shortening produced by the descent of the uterus.*

The vagina is in relation by its external face: in front, with the bas-fond of the bladder, to which it is united by some condensed areolar tissue, and also with the canal of the urethra, which indeed appears to be channeled out in its substance; behind, it is connected with the rectum, superiorly by a double fold of peritoneum, and inferiorly by areolar tissue, which is less condensed than that existing in front. Hence the rectum is seldom drawn upon in the displacements of the uterus, whilst the bladder always participates more or less in these accidents.

The lateral borders afford attachment, above to the broad ligaments, and below to the pelvic areolar tissue and to some venous plexuses. The internal face of the vagina is covered by a mucous membrane, continuous with that of the uterine cavity, excepting that its epithelium is not prolonged into the orifice of the latter, but terminates by a sort of denticulated border, similar to the relation of the oesophageal epidermis with the stomach; the internal surface also exhibits some wrinkles or rather some transverse elevations near the vulvar orifice. A raphé, or prominent ridge found on the median line, extends the whole length of the anterior wall of the vagina, affording origin to all those rugæ; but the raphé is not so well marked on the posterior parietes as on the anterior; the term *columns of the vagina* has been applied to these two ridges.

The transverse rugæ are much better developed in young virgins and aged females; but, on the contrary, during pregnancy, and for a short time after delivery, they are nearly effaced.

The mucous membrane contains a large number of muciparous glands that secrete abundantly; these are particularly numerous at the inferior part of the canal.

The superior extremity of the vagina embraces the neck of the uterus, upon which, indeed, it is prolonged without an evident line of demarcation; and by thus folding in, to embrace the neck, the vagina forms a groove, or circular pouch, bearing the names of the anterior and the posterior culs-de-sac; the latter is generally deeper

* M. Cruveilhier says these eases are daily confounded in practice, though nothing, however, is easier than to distinguish them from each other; for, in the former one, the uterus cannot be raised, whereas, in the ease of descent, it yields without resistance to the pressure of the finger, and resumes its natural position.

Congenital shortening is a frequent cause of sterility, as well as of sharp pains in coition, and is a fruitful source of the acute or chronic inflammatory engorgements of the uterus. I have met with a case of considerable shortening of the vagina, in which the os tineæ had been sufficiently dilated by the *membrum virile* to admit the index finger. In some instances, the repeated coition produces a sort of artificial vagina, behind the os uteri, at the expense of the posterior vaginal wall, and if the finger be then carried under the neck of the womb, it will dip into a pocket, the anterior wall of which is placed against the posterior one of the uterus. This artificial vagina, produced by forcing up the posterior cul-de-sac, is sometimes longer than the natural canal. (*Anatomie Descriptive.*)

than the anterior, owing, probably, to the insertion of the vagina into a more elevated part of the neck behind.

The inferior extremity, or vulvar orifice, presents, in front, a transverse rugous prominence, that seems to diminish the entrance.

Structure of the Vagina.—The parietes of the vagina are formed of an erectile, spongy tissue, interposed between two very strong fibrous laminae, the external of which is the thicker; around the erectile tissue, a condensed layer of moderate thickness is found, analogous to the structure of the dartos membrane; and, in addition to these, a few muscular fibres, that constitute the constrictor vaginalis muscle, are situated around the outer extremity. In some females, this is quite strong and well developed.

Finally, under the name of *bulb of the vagina*, a swelling or cavernous body is described, that separates the orifice of this canal from the roots of the clitoris: moderately thick in the centre, where it is placed between the meatus urinarius and the junction of the cruræ clitoridis, it gradually swells out, as it recedes from this point, and terminates below in an enlarged extremity on the sides of the vagina, being deficient, however, on the posterior wall of the canal.

The bulb is composed of an erectile tissue, similar to that in the bulb of the male urethra, and M. Deville has clearly demonstrated that it communicates freely with the cavernous tissue of the clitoris, by several large veins.

Vessels.—The vaginal arteries come from the hypogastric; the

veins are very numerous and plexiform, and discharge into the hypogastrics; the lymphatics empty into the ganglions of the pelvis, and the nerves arise from the hypogastric plexus.

The vagina serves in the female both as the organ of copulation and as the canal for the passage of the menstrual fluid, and for that of the product of conception.



A. The uterus, seen on its anterior face. B. The intra-vaginal portion of the neck of the uterus. C. The Fallopian tubes. D. The pavilion, or fimbriated extremity of the tube. E. The ovaries. F. The ligament of the ovary. G. The round ligaments. II. The vagina, laid open.

On the right, the fimbriated extremity of the tube is seen applied to the ovary.

ART. II.—OF THE UTERUS.

The uterus is the organ of gestation, in which the ovum is destined to remain, from the period of its escape from the Fallopian tube, until the moment of final delivery.

In form, it resembles a small gourd, or a pear flattened from before backwards, having its

base turned upwards and the apex downwards. The axis runs from

above downwards, and from before backwards, corresponding nearly with that of the superior strait.

It is situated in the excavation, usually under the median line, between the bladder and rectum, being retained in position by the round and the broad ligaments on the sides, and below by the vagina, upon which it rests. The connections of the uterus are very loose and extensible; consequently, this organ exhibits a great degree of mobility, and may easily be moved in every direction.

Its volume varies with age, being quite small prior to the fifteenth year, but augmenting rapidly at this era; the womb returns very slowly to its primitive dimensions in women who have borne children, and finally, in advanced age, it often appears to waste away, and to dwindle down to the size it had prior to the fifteenth year. Its dimensions after puberty are as follows; viz: The vertical diameter varies from two and three-fourths to three and one eighth inches; the transverse one, at the fundus, one and three-eighths to one and a-half inches, and at the neck, about half an inch in every direction. Certain physiological conditions produce a great augmentation in its volume. For instance, I have frequently observed at the approach of the monthly courses, that it presented twice the ordinary size at least, and even in some women the increase in volume is so marked at this period, as to be mistaken for the commencement of a pregnancy (*vide Diagnosis of Pregnancy*).

The uterus likewise varies in situation at different epochs; thus it surmounts the superior strait in the foetus, and rests in the abdominal cavity, so that the Fallopian tubes and ovaries occupy the iliac fossæ, the fundus uteri corresponding to the fifth lumbar vertebra. After birth, this organ, in consequence of the development of the basin, appears to sink gradually into the excavation, and, at ten years, the fundus is on a level with the superior strait, but subsequently gets below this point. The womb is generally inclined to the right or left in aged females, or is turned backwards on the rectum.

The axis uteri approaches that of the inferior strait in many women, especially in those having a short vagina. It must further be observed, that the direction described by us as normal, is far from being constant in those who have had many children, as a great variety of circumstances may change it; thus, in some cases, the fundus may be thrown so far forwards as to render the anterior wall the most inferior part, thereby constituting what pathologists have described as an *anteverision*; in others, the superior border is thrown towards the most inferior portion of the sacrum, the neck being carried behind the posterior face of the pubis, thus producing a *retroversion*; again, it is often turned towards one side of the excavation, the neck being directed to the opposite side: this is *lateral version*; and finally, in some subjects, the body of the uterus is bent on the neck, either behind or in front, like the body of a retort on its stem. M. Velpeau was the first to describe, I believe, this vice of conformation, under the names of *anteflexion* and *retroflexion*.

The weight of the womb, in girls at puberty, is from six to ten

drachms; but in women who have had children, it ranges from an ounce and a-half to two ounces; and from one to two drachms in very aged females.

The uterus exhibits an external and an internal surface.

§ 1. EXTERNAL SURFACE.

The external surface presents for our study two faces, two borders, a base, and an apex.

The anterior face is slightly convex, is covered by the peritoneum on its superior three-fourths, and lies in a mediate relation with the posterior face of the bladder, from which it is frequently separated by some folds of the small intestine; whilst, at the inferior fourth, it is in contact with the bas-fond of the bladder, to which it is united by some loose cellular tissue. This latter connection explains the frequent participation of the bladder in the uterine displacements, however inconsiderable they may be.

The posterior face is much more convex than the preceding, being covered throughout its whole extent by the peritoneum; it is in a mediate relation with the anterior surface of the rectum, the intestinal convolutions, however, often separating them; it may be readily examined through this gut. The lateral borders are slightly concave, affording an attachment to the broad and the round ligaments; but, as M. Cruveilhier remarks, these ligaments are attached to the anterior edge of the borders, and hence all the thickness of these margins is found behind the broad ligaments, and consequently the latter are on the same plane as the anterior face of the womb.

The base, fundus, or superior border of the matrix, is convex, looking upwards and forwards, and covered by the convolutions of the small intestine. It never attains the level of the superior strait in the unimpregnated state, and therefore it is only possible to feel it through the inferior abdominal wall, by using great pressure.

At the junction of this base with the lateral borders of the body the two angles are formed, from which the Fallopian tubes and ligaments of the ovary arise.

The inferior extremity, or the uterine neck, is located in the upper part of the vagina, and merits the accoucheur's most particular attention.

OF THE NECK OF THE UTERUS.—Very remarkable differences are found between the neck of the uterus in a woman who has borne children, and that in one who has never been a mother; we shall, therefore, consider it successively in each, because the modifications it undergoes during pregnancy can only be appreciated after a careful study of the ordinary condition.

1st. *In the woman who has never been a mother*, the neck of the uterus is from an inch to an inch and three-eighths in length, and is separated from the body by a narrow, constricted portion, which can easily be distinguished, even on the exterior of the organ. At the

central part, where it is a little enlarged and fusiform, it is about three-quarters of an inch in the transverse diameter, and half an inch in the antero-posterior one. Near the junction of the superior third with the inferior two-thirds, it is embraced by the upper end of the vagina, which descends a little lower on the anterior than on the posterior face, whence the sub-vaginal portion of the neck is somewhat longer behind, but the contrary is true for that part above the vagina.*

The cervix is terminated by an extremity that is less voluminous than the other portions of its extent, which bears the name of the *os tincæ*, or tench's mouth. The *os tincæ* presents two lips, separated by a small transverse fissure, somewhat swollen in the middle, called the external orifice of the neck. This orifice, from being completely closed up, is sometimes difficult to find in a young marriageable girl. But, according to Dubois, if the index encounters it, we may recognize the part by comparing the sensation then experienced with that produced by applying the pulp of the finger upon the extremity of the nose, and feeling the depression between the alæ nasi. The anterior lip is the thicker, though both are very nearly of the same length, the anterior one, perhaps, descending a little lower than the other. These lips are smooth and polished throughout, neither presenting any inequalities nor any depressions; in fact, the whole external surface of the neck is equally smooth, and without elevations.

The cervix is slightly directed backwards, so that, if prolonged, it would terminate near the coccyx, or the most inferior part of the sacrum. It is situated in the upper half of the excavation, yet the finger can easily reach and pass over its whole exterior surface.

2d. *In the female who has had several children*, the neck has not the same aspect, and the length is so variable that it is not possible to announce it in advance, though we may say, in general terms, that it is shorter in proportion to the larger number of children the woman has borne, a portion of it seeming, as it were, to have been destroyed at every accouchement.

Two females, one of whom had seventeen the other nineteen children, have been under my care; the neck in each of them was completely destroyed, in its intra-vaginal portion. No prominence was found at the superior part of this canal, and the finger only

* Most authors teach that the anterior lip of the neck descends lower than the posterior. In detaching the uterus from a dead body no great difference, however, is observed in this respect; but, on the contrary, if we touch a female the distinction is much better marked. I believe this results solely from the fact of the neck being directed a little posteriorly, so that the surface of the *os tincæ* is not horizontal, but inclined backwards; and, therefore, the anterior lip is necessarily somewhat lower than the posterior. Besides, the finger in passing from below upwards, and from before backwards, must first encounter the anterior lip, and is then obliged to go higher and further behind to reach the posterior one.

encountered two little tubercles, as large as a lentil, separated by an open orifice, by which latter alone, the neck could be recognized. Although it still preserves a certain length, the regular form that it previously had is wanting, for it is no longer a fusiform body, with an exterior surface polished and smooth everywhere, but a kind of an irregular teat, covered on its external face by more or less numerous elevations.

Sometimes it is more swollen at the inferior portion, whilst the upper part appears to be hollowed out in its whole circumference by a deep excavation.

The orifice of the os tincæ is sufficiently patulous to admit the extremity of the finger, or even one-half of its unguial portion may occasionally be introduced. The lips are unequal, presenting a variable number of notches. Being rarely found on the middle part of the lips, these depressions are continually met with about the level of the commissures, and more frequently on the left side than the right.* They result from the lacerations that have occurred in former labours, at the moment when the head cleared the os uteri; and the lochial discharges have prevented the lips of these little wounds from uniting, and they have individually cicatrized. The depressions are sometimes so numerous as to subdivide the lips into six or eight small tubercles, separated by as many fissures of variable depth.

In case the woman has not had children for several years, and more especially if she has had but one or two of them, these characters are much less determined, the orifice is nearly obliterated, and the neck has gradually resumed its primitive form; nevertheless, the fissure of the orifice is always sufficiently marked, as well as the inequalities on the lips, to recognize antecedent labours. These marks may become more and more faint, but they never disappear altogether.

§ 2. INTERNAL SURFACE.

The uterus presents an internal surface circumscribing its cavity. This latter is divided into the cavity of the body, and that of the neck.

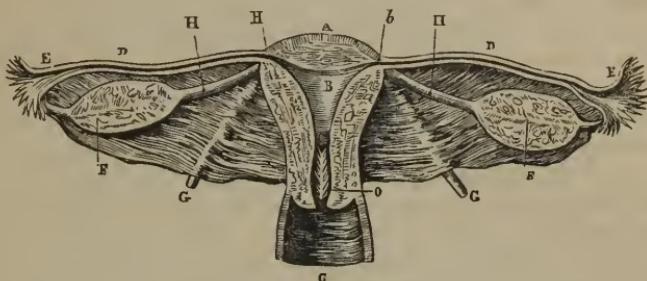
A. The *cavity of the body* is triangular in shape, presenting an orifice at each of its three angles; the inferior one of which establishes a communication between the cavities of the body and neck, and hence is called the internal or uterine orifice. The other two

* The frequency of these depressions on the left side may be, I think, readily explained. At the period of the head's passage through the neck, it is evident that, if a laceration be produced, it will be at the point which sustains the greatest effort. Now, the left occipito-iliac positions being much the more frequent, the occiput which constitutes the largest extremity of the head will consequently correspond to the left commissure of the neck. Further, the uterus is habitually inclined to the right, so that the line of its contractions is directed from right to left, and, therefore, acts more energetically on the left side of the cervix. Hence the most violent efforts occur at this point.

are the orifices of the Fallopian tubes; they are scarcely visible, and occupy the bottom of the funnel-shaped cavities found at the superior angles of the womb.

Fig. 9.

Cavity of the uterus and the Fallopian tubes.



A. Superior border or fundus of the womb. B. Cavity of the womb. C. Cavity of the neck of the uterus. D. The canal of the Fallopian tube cut open. E. The fimbriated extremity or pavilion, likewise laid open. F. The ovaries, one-half of which has been removed so as to bring into view several of the Graafian vesicles. G. The cavity of the vagina. H. The ligaments of the ovaries. I. The round ligaments.

The congenital deficiency of a cavity in the body is very rare, but yet no trace of it existed in a uterus presented to M. Cruveilhier by M. Rostan, although that of the neck remained.

B. The *cavity of the neck* is fusiform, flattened from before backwards, and presenting rugæ on its anterior and posterior walls, which form a tolerably regular whole, and constitute a median vertical column upon each wall, occupying the whole length of the neck, and from which a number of smaller columns pass off at various angles, representing a fern in relief. The term *arbor vitæ* has been applied to these rugosities. After delivery they frequently disappear, but sometimes they still persist.

The uterine cavity likewise exhibits a variable number of transparent vesicles, which Naboth has mistaken for eggs, hence they have been called the *ovula Nabothi*. These vesicles are nothing more than simple muciparous follicles, and they are particularly abundant in the neighborhood of the neck.

The internal surface of the uterus is much more vascular in the body than in the neck. This difference is particularly well marked in women who have died during the menstrual period.

§ 3. STRUCTURE OF THE UTERUS.

In the ordinary condition of the womb, this structure is difficult to make out, but it becomes much more evident during the period of gestation.

The constituent parts of the organ are: a peculiar tissue, an external peritoneal membrane, and an internal mucous one, together with numerous vessels and nerves.

A. *Peculiar Tissue*.—This tissue is of a grayish colour, and is very

dense in structure, creaking like cartilage under the scalpel. In general, the neck appears less firm in consistence than the body, resulting, as M. Cruveilhier supposes, from the former being the more frequent seat of sanguineous fluxions.

The uterus is more flexible, and of a brighter red hue, in some particular cases; such as a suppression of the menses, and also during the period immediately following or preceding the courses.

The proper tissue of the womb is composed of fibres disposed lengthwise. The nature of these fibres has led to numerous discussions, but at the present day they are generally considered to be in muscular in character, and, since this muscular nature becomes clearly evident towards the end of gestation (*vide Pregnancy*), we must acknowledge that, notwithstanding the fibrous appearance of its tissue in the unimpregnated condition, the fibres composing it are not the less muscular in their structure. This organization is concealed by the state of condensation; of atrophy, maintained either by inertia or want of action; but which becomes distinct, in consequence of the very considerable determination to the uterus; of its distension, and of the development of its fibres during pregnancy.

According to most anatomists, the direction of these fibres in the state of vacuity, is very irregular, and their inter-crossing is nearly inextricable, as every one must confess, in this particular condition, says M. Cruveilhier. But as the structure of the uterus, except in gestation, is not of any consequence (practically speaking) to the accoucheur, we refer to the article *Pregnancy* for the more particular study thercof.

b. The External or Peritoneal Membrane.—The peritoneum having covered the posterior face of the bladder, is reflected upon the anterior one of the uterus, covering only its superior three-fourths; and having reached the fundus uteri, and gained the posterior wall, it covers this entirely, is prolonged on the vagina for a short distance, and is then reflected upon the rectum. The broad ligaments are produced by the transverse elongations of this membrane; and its falciform folds, seen in the interval that separates the bladder from the uterus, are called the *vesico-uterine*, or the *anterior ligaments*; and those formed by it, between the rectum and uterus, are called the *posterior*, or the *recto-uterine ligaments*. The adherence of the peritoneum is quite loose on the borders of the uterus, but it becomes more intimate towards the median line.

c. The Internal or Mucous Membrane.—The existence of the latter has been denied; but the presence of a mucous membrane is easily proved after an accouchement. To the reasons already offered by Morgagni, Chaussier, &c., in favor of its existence, we shall add those presented by Cruveilhier, which appear to us perfectly conclusive, viz.: 1st. Every organic cavity communicating with the exterior is lined by a mucous membrane. 2d. Anatomy demonstrates that the vaginal mucous membrane is continued into the cavity of the neck, and then into that of the uterus, only it is

deprived of its epithelium in penetrating the latter. 3d. When examined by a lens, the internal surface of the uterus exhibits a papillary disposition, but the papillæ are imperfectly developed. 4th. This internal surface has follicles or crypts spread over it, from which mucus can be squeezed out, and which, if their orifices be obstructed or obliterated, become distended by the liquid, and form little vesicles. 5th. It is continually lubricated by mucus. 6th, and lastly; the internal surface of the uterus, like all other mucous membranes, is subject to spontaneous hemorrhages, to catarrhal secretions, and to the mucous, fibrous, and vesicular vegetations, called *polypi*; and it is generally admitted that, wherever there is an identity of action, there is also an identity of nature.

d. Vessels.—The arteries of the uterus come from the hypogastric and ovarian arteries. Both series describe a number of flexuositieis in the tissue of the organ. The veins empty into the corresponding trunks. The lymphatic vessels are very numerous, and run to the pelvic and lumbar ganglia.

Some of the nerves come from the sacral plexus, and others from the renal and hypogastric plexuses of the ganglionic system (*vide art. Pregnancy*). The first are almost entirely distributed to the neck; and it is quite natural to attribute to them that excess of sensibility enjoyed by this part, more especially during pregnancy; whilst the second, being destined, as is well known, to the organic life alone, is distributed to the body of the organ.

Development.—According to some authors, the uterus is bifid in the embryo as late as the end of the third month, but M. Cruveilhier says he has never observed this bifurcation. During the intrauterine life, the volume of the neck surpasses that of the body, and, at this period, its largest portion corresponds to the vaginal extremity. After birth, it remains nearly stationary, almost to puberty, and then it acquires, in a very little time, the dimensions observed in the adult woman: the organ often becomes atrophied in old age.

§ 4. LIGAMENTS OF THE UTERUS.

We have already spoken of the anterior and posterior ligaments. The broad and round ones still remain to be described.

The Broad Ligaments.—As elsewhere stated, the double lamina of the peritoneum, which covers the anterior and posterior faces of the uterus, is prolonged transversely, the two folds resting against each other, and forming by their union a transverse partition, extending from each side of the uterus, which divides the pelvis into two cavities; the anterior of which lodges the bladder, and in the posterior the rectum is seen. Outwardly, and below, these ligaments are continuous with the peritoneum that lines the excavation; their superior border is free, and is extended from the angles of the uterus to the iliac fossæ—presenting three folds, called the wings. The anterior wing is not admitted by some anatomists; it is but slightly developed, and is occupied by the round ligament. The middle one encloses the Fallopian tube, and the posterior contains the ovary and its ligament.

The two serous folds that constitute the broad ligament, are separated by a loose and very extensible lamellated cellular tissue continuous with the *fascia propria* of the pelvis. The broad ligaments disappear during gestation, their two laminæ assisting to cover the anterior and posterior faces of the developed womb. The *round ligaments*, or supra-pubic cords, are evidently continuous with the tissue of the uterus, to which their proper substance is precisely similar; arising from the lateral border of this organ, below and a little in advance of the Fallopian tube, it runs upwards and outwards by raising up the anterior fold of the broad ligament, and reaches the internal orifice of the inguinal canal, into which it enters, accompanied by a prolongation of the peritoneum, bearing the name of the Canal of Nuck. It then divides into a number of fibrous fasciculi, which are lost in the cellular tissue of the mons veneris and labia externa. According to Madame Boivin, the round ligament on the right side is the shorter and larger of the two. They contain a great number of veins, which are liable to become varicose.

These ligaments serve to retain the uterus in position, and to prevent its displacements; and it is probably to them that the pains in the groins, experienced by some women, during chronic affections or displacements of the womb, may be referred. They are, in a great measure, composed of cellular tissue and vessels, but containing also some muscular fasciculi, the superior of which are prolonged from the uterus, and the inferior come from the internal oblique muscle. The superior muscular fibres are much more evident during pregnancy.

ART. III.—OF THE FALLOPIAN TUBES.

The *uterine*, or *Fallopian tubes* are two canals, varying from four and a quarter to five inches in length, and placed in the thickness of the superior border of the broad ligament. They extend transversely from the lateral angles of the womb nearly to the iliac fossa on the corresponding side. Their calibre is very variable in different parts; extremely contracted in the internal half, it enlarges in the external, towards the free extremity, which spreads out and becomes fringed. This termination constitutes the pavilion, or fimbriated extremity (the *morsus diaboli*).

It is generally taught that one of these fringes, which is longer than the others, attaches itself to the extremity of the ovary. On the contrary, M. Cruveilhier believes that this adherence takes place through the intervention of a little ligament. All the fringed folds border upon a small circle that is more contracted than the surrounding portion of the tube, and this opening is called the *free orifice of the tube*. The *internal*, or *uterine orifice* is the name given to that one by which it opens into the uterine cavity.

The peritoneum forms the external tunic of the tube; the internal one consists of a mucous membrane, a prolongation of that of the uterus on the one part, and continuous with the serous peritoneum

on the other. Lastly, a middle layer, evidently a continuation of the proper uterine tissue, completes its structure.

The mucous layer is composed of two laminae of fibres, the exterior of which has a longitudinal direction, while the internal are circular. Its vessels are derived from the ovarian, and the nerves from the great sympathetic.

The Fallopian tube serves the double purpose of a canal for transmitting the fecundating principle of the male, and for carrying the germ furnished by the female from the ovary to the uterus.

The use of the fimbriated extremity is to embrace the ovary at the moment of fecundation, and probably also at each menstrual period, and to apply itself over the point of the germ's detachment. At this time, the vessels of the Fallopian tubes are engorged—the mucous membrane assumes a well-marked red color—the walls are thickened—the canal enlarges, and its uterine extremity is filled by an albuminous mucosity, resembling that of which the caducous membrane is formed. The tubes are simultaneously excited by peristaltic contractions, which are probably intended to propel the ovule into the uterine cavity.

According to Dr. Hamilton, of Edinburgh, the Fallopian tube undergoes some modification during gestation, to which he attaches great importance, as a characteristic sign of pregnancy. This change consists in the formation of a little pocket, or sac, about an inch from the fringed extremity. This partial dilatation of the tube, previously described by Roederer under the name of *antrum tubæ*, is certainly an exceptionable fact. I have never observed it; and M. Montgomery has encountered it but once in fourteen uteri, examined in the state of gestation; so that it cannot have all the importance that certain authors wish to ascribe to it.

ART. IV.—OF THE OVARIES.

The ovaries (*testes muliebres*) are the analogues in the female, to the testicles of the male; that is, both of them secrete a product indispensable to reproduction. Two in number, they are situated on the sides of the uterus, in that portion of the broad ligament called the posterior wing, just behind the Fallopian tube. They are maintained in position by those ligaments, as also by a special one, denominated the ligament of the ovary.

The ovaries vary in situation, according to the age of the individual, and the state of the uterus. In the foetus, they are placed, like the fundus uteri, in the lumbar region; but, during gestation, they rise into the abdomen along with the body of the uterus, upon the sides of which they are attached.

Immediately after delivery the ovaries occupy the iliac fossæ, where they sometimes continue throughout life; again, it is not at all uncommon to find them turned backwards, and adherent to the posterior face of the womb.

The ovaries vary in size, both from age, from the plenitude or vacuity of the matrix, and from health or disease. Being propor-

tionably larger in the foetus than in adult age, they diminish after birth, augment in volume at puberty, especially at the monthly periods, and again dwindle away in old age. During pregnancy and after delivery, they acquire, in some cases, quite a considerable volume.

Fig. 10.



The external face of the ovary.

The ovaries are ovoidal in shape, a little flattened from before backwards, of a whitish color, and their surface is rough and fissured.

§ 1. STRUCTURE OF THE OVARIES.

This organ consists, 1st, of a dense fibrous envelop covered by, and intimately united to, the peritoneum; 2d, of a spongy, vascular tissue, the meshes of which seem to be formed of some very delicate prolongations of the exterior envelop, analogous to glandular tissue.

Baér has given to the sub-peritoneal fibrous envelop the name of the *stratum superficiale*, and that of the *stratum intimum seu proprium* to the proper ovarian tissue. He designates both of these laminae (which he considers of the same nature) under the title of *stroma*. The glandular substance exhibits a number of small cavities, in which some little follicles, described by Graaf, and bearing his name, are found enclosed.

Some of these follicles or vesicles are plunged into the very interior of the organ; others, that are larger and better developed, occupy the surface, where they are more or less embedded in the stroma, producing sometimes little rounded elevations on the latter, which give a tuberculous aspect to the whole ovary.

In such cases, they are only covered on the free surface by the proper tunic of the ovary, which occasionally becomes so thin there, as to exhibit the serous lamina alone. The number of well-marked vesicles varies from fifteen to twenty in the adult female, but with the aid of a microscope a much larger number can be brought into view, which, although still very small, will be gradually developed as the others shall have accomplished their mission.

§ 2. OF THE OVARIAN VESICLES.

These vesicles are composed of two portions; 1st, of a containing part, the *envelop*; 2d, of a contained one, the *nucleus*. The former consists, 1st, of some foreign parts, those not proper to the vesicle itself, but appertaining to the ovary, and which are subtended and transformed by it into teguments; and 2d, of a proper capsule for the vesicle.

A. The *tegument* (*indusium*, Baér) only invests the prominent part of the vesicle, being formed of a peritoneal lamina and of a thin layer of the stroma or proper ovarian tissue.

B. The *capsule* (*theca*, Baér) is composed of two laminae, the external and the internal. The former is thin but tenacious, semi-transparent, and formed, like all thin membranes, of a dense cellular

tissue; some vessels ramify in its substance, and their extremities go to the internal layer. This latter is softer, thicker, and more opaque; its internal surface is lubricated, exhibiting granulations, and some extremely delicate villosities, whilst the outer surface is intimately united to the external layer; the little vessels that penetrate it, immediately subdivide into very delicate rami, assuming a penicillous arrangement, so as almost to constitute a third layer, which is essentially vascular.

c. The parts entering into the composition of the *nucleus* are, 1st, a granular membrane which encloses the humor of the Graafian vesicle, and 2d, a liquid produced by the aggregation of three humors of a different aspect, viz., a limpid mucosity, clear, though a little oily, a number of small rounded granulations, transparent in their central cavity, and slightly opaque at their periphery, and some oil globules. 3d, and lastly, an ovule floating in the midst of this liquid.

1. The *granular membrane* (vide Fig. 11, g'). A delicate membrane is found applied on the internal face of the Graafian vesicle, formed of granules, or rather of cellules, and bearing the name of the granular membrane. It tears with great facility, from its extreme tenuity, and hence many authors have denied its existence. Upon one part of the membrane (that corresponding to the free side of the vesicle) the granulations, or cells producing it, are more numerous or more compact, and in the centre of this compact mass, which has been called the prolixous disk, the ovule is found.

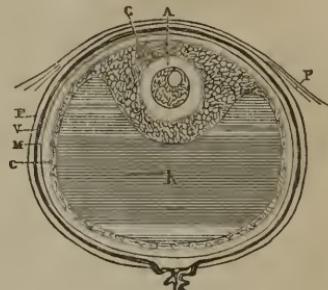
The granulations, constituting the prolixous disk (vide g, Fig. 11), are so closely united, both with each other and with the latter, that upon opening the Graafian vesicle, even where the granular membrane is destroyed, this portion remains adherent to the ovule, forming around it, as it were, a granular bed.

§ 3. OVULE, OR HUMAN EGG.

Since the labors of Graaf, the majority of authors agree with him, that the ovule is constituted by the vesicle just described; but the honor of having first discovered the ovule, as a distinct organ in this vesicle, belongs to Charles Ernest Baer. The ovule is completely formed in the ovary during the earlier years of life. It is embedded from the period of its maturity, as stated above, in the midst of a mass of granulations, which are more compact than those which fill the remainder of the vesicle. When examined with a lens, it appears as an opaque, rounded body, at least, more opaque than the liquid enclosed in the same vesicle: it is extremely minute,

Fig. 11.

The ovule in the Graafian vesicle.



A. The ovule. g. The granular cumulus.
g'. The granular membrane. K. The cavity of the Graafian vesicle. M. The mucous surface. v. The vascular layer. F. The fibrous layer. P. The peritoneal coat.

although the diameter of the little sphere it represents is subject to variations.

"The largest human ovules I have seen and manipulated," says Bischoff, "did not exceed the tenth of a line, being barely perceptible to the naked eye."

When placed under a microscope, it is seen to consist of an exterior envelop, called the *vitelline membrane* (Coste), *transparent zone*, *cortical membrane*, or *chorion* (Baér), of a substance aptly compared to the yolk of an egg, and designated as the *vitellus*, and of another vesicle (placed within the latter) called the *germinal vesicle*.

A. *Vitelline Membrane*.—If the ovule be examined by a magnifying glass of sufficient power, an obscure sphere will be brought into view, surrounded by a large clear ring, the nature of which it is difficult to make out. M. Coste has given the name of the vitelline membrane to

A. The vitelline membrane, or transparent zone. B. The vitellus, or yolk. C. The vesicle of Purkinje, or the germinal vesicle. D. The germinial spot.

this ring. It is evidently a thick membrane, the external and internal outlines of which assume the appearance of two circular lines enclosing a transparent ring. Many persons have merely considered it as a layer of albumen surrounding the yolk, but any one may easily convince himself that it is at least a resisting membrane, by cutting the ovule, or by compressing it by means of an instrument called the compressor; "for after proceeding in this manner," says Bischoff, "there cannot be a doubt that the transparent zone is an elastic, thick, hyaline, and transparent membrane, without a determinate texture."

B. *Yolk, or Vitellus*.—The cavity of the vitelline membrane is occupied, in a great measure, by a granular liquid that does not adhere to the exterior envelop, and even escapes from it readily when the latter is broken.

According to Bischoff, the yolk of the human ovum is formed of a coherent, indistinctly granular, transparent, and viscous mass, which does not run out when the egg is cut or crushed; each portion of the zone reserving its particular segment of yolk, or the latter escaping altogether.

"In certain cases," says he, "the vitelline granulations are not united in a single mass. I have seen the yolk divided in two, and, on one occasion, into five parts of different volume."

The vitellus usually fills the interior of the zone completely, and has the same form, but sometimes the vitelline sphere is smaller than that destined to receive it. Some authors likewise believe that a very delicate membrane exists, which encloses and unites the yolk in a single mass; but Messrs. Coste and Bischoff agree in rejecting the existence of this, and contend that the granulations of

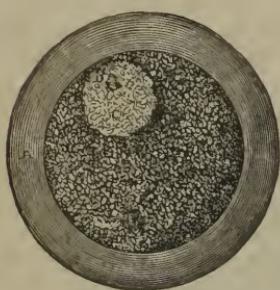


Fig. 12.

A non-fecundated human egg, or ovule.

the vitellus are placed in juxtaposition with the transparent zone which forms its sole and only envelop.

c. *Germinal Vesicle*.—In the midst of this yellow body, in very young girls, or on one of the neighboring points of the peripheral envelop in the matured ovules, a small, perfectly transparent, and colorless vesicle is seen like a clear spot, surrounded by a mass of a deeper yellow. Purkinje had described it in the eggs of birds, and given his own name to it, but M. Coste is entitled to the honor of having first demonstrated its existence in the ovum of mammiferæ, and of thus having established the perfect identity between this latter and the egg of birds. This is the vesicle of Purkinje, or the *germinal vesicle*. It is slightly oval, and consists of a very delicate, transparent, and colorless membrane, which encloses a liquid that is frequently as limpid and transparent as itself, but sometimes containing a few granules. Notwithstanding its extreme tenuity, this vesicle still offers a certain consistence, since it has been seen intact, after leaving the ovule, and being completely separated from the granular liquid in which it was placed.

It is always very small, and scarcely measures the sixtieth of a line in diameter.

d. *The Germinal Spot*.—If the germinal vesicle be attentively observed, an obscure rounded spot will be seen on some part of its periphery; this was first discovered by Wagner, who gave it the name of the *germinal spot*. It seems to be formed by the aggregation of fine small granules, or little globules, the obscure hue of which is brought out by the clear contents of the vesicle. Wagner has sometimes met with two, or even more, germinal spots in the mammiferæ.

Before fecundation, therefore, the ovule is composed: 1st, of an exterior envelop, the vitelline membrane, or transparent zone; 2d, of a vitellus, or yolk, contained in this vesicle; 3d, of a little vesicle enclosed in the first and swimming in the vitelline fluid—the *germinal vesicle*; 4th, and lastly, of the *germinal spot*.

We shall now proceed to examine more fully the modifications it undergoes after conception.

§ 4. OF THE MODIFICATIONS EXPERIENCED BY THE OVARIAN VESICLES.

The Graafian vesicles, that were scarcely visible in the young girl prior to puberty (although they may be found immediately after birth), undergo, at the former period, a considerable development; that is the starting-point of their maturation. All, however, are not equally precocious, and some fifteen or twenty of them, as before stated, are already matured and signally developed, whilst hundreds of others, which are still very small, and concealed in the central portion of the ovary, are destined to develop themselves gradually, so as to replace in succession the more premature ones.

Until quite recently, the profession in general had believed that these vesicles were only intended to contain and nourish the ovule,

thus contributing to its development and to render it fit for fecundation. But the researches of

Fig. 13.

Showing the ovary, and a Graafian vesicle at its highest degree of development, and just before its rupture.



A. The hypertrophied vesicle (drawn from nature, and of its real size). B C C. Radiated cicatrices left by previously ruptured vesicles.

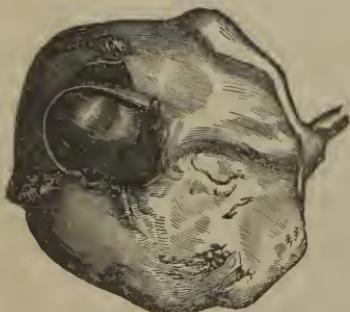
a small nut, surmounting the ovarian mass. Whilst this enlargement is in progress, the walls of the vesicle, although more and more distended, become less diaphanous, in consequence of the thickness of the internal membrane, and the hemorrhage that occurs towards the last in the interior of the vesicle.

The effused blood, mixing with the fluid it normally contains, greatly distends the walls, and this distension is carried so far as to render a laceration imminent, and a point is soon distinguished on the most elevated part of the tumor, where this will take place. This point usually assumes the appearance of a reddish spot, about a line in extent, resulting from a strong injection, as also from a slight effusion of blood into the substance of the vesicular tunics (Raciborsky), and soon after the walls, yielding to the enormous distension they have undergone, give way. Subsequent to the rupture,

the ovum and contents of the vesicle escape into the peritoneal cavity. The vesicular walls shrink up, and their cavity contains a minute quantity of liquid or coagulated blood (according to the period of examination), which has oozed from the torn margins.

It is not only after a fruitful coition that one of the vesicles is ruptured; but this phenomenon is intimately connected with, and is reproduced at, every appearance of the menses. In due time, the walls of the torn vesicle retract, the clot, originally as large as a small cherry, is absorbed little by little, and the former spacious cavity diminishes;

Fig. 14.



The ovary, with the ruptured vesicle and the large clot that fills its cavity. (Drawn from nature.)

the margins of the fissure approach each other, and sometimes even cicatrize. Consequently, the ovary of a female who has been regular for several years, has its rough, uneven, and fissured surface covered by dark cicatrices.

These cicatricula, which are variable in number, and whose presence, until recently, was considered as an evidence of so many previous conceptions, result simply from the lacerations that occur at each and every monthly period.

Some of the scars are linear, others triangular, and again they are radiated; when recent, of a red color, but becoming brownish after several months, and, after a time, deep furrows are gradually formed by their retraction.

In certain cases their margins do not completely unite, a little opening being thus produced, which communicates with the torn cavity.

The modifications just described, resulting in the expulsion of the ovule from the interior of the vesicle, are altogether similar to those which take place in the mammiferæ at the period of heat. In them, likewise, the approach of the male is not necessary to the discharge of the egg, for, after the rupture of the vesicle, the ovule engages in the oviduct, and frequently arrives in the cavity of the womb long before a sexual approach. Spontaneous maturation is not, therefore, a phenomenon confined to the oviparæ, but is also produced in the human species at the menstrual periods, and in mammiferæ at the time of rutting. This is clearly proved by the satisfactory researches of M. Raciborsky, who has particularly devoted himself to elucidating this point of comparative physiology.

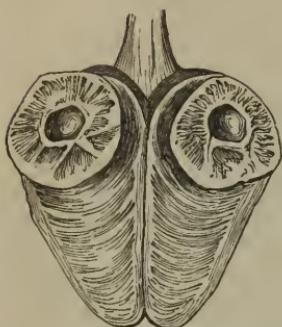
To render justice, however, to every one, we must acknowledge the labors of Pouchet of Rouen, of Bischoff, Nègrier, and Gendrin; and further, we must observe that M. Coste, in 1836 (and consequently before them), had, in his *Leçons d'Embryogenie Comparée*, clearly established the existence of spontaneous ovulation in the mammiferæ. He expresses himself as follows: "The passage of the ovule to the womb does not take place at a uniform period in all females, because, since the rupture of the Graafian vesicles is produced independent of copulation (as the existence of corpora lutea in the ovaries of virgin females fully proves), it follows that if coition takes place at the period of their full maturity, they will escape from the vesicles, either at the moment itself, or at a more or less distant epoch, according to the manner of rupture, whether slow or otherwise. It may also be readily understood, that if coition does not take place until after the period of their normal maturity, the ovules, having arrived in the uterus, or being on the passage thither, will receive the influence of the conception, either in the womb, or while traversing the canal." (Coste, *Embryogenie Comparée*, vol. i. p. 455.)

§ 5. OF THE CORPUS LUTEUM.

Soon after the ovule has left the Graafian vesicle, whether its ex-

pulsion has been the consequence of coition, or of the appearance of the menses, a peculiar glandular mass is developed in the vesicle, known as the *yellow body*, or the *corpus luteum*.

Fig. 15.



The ovary laid open longitudinally, and showing the corpus luteum at its full development.

the ovarian stroma; but this opinion is inadmissible; Montgomery and Patterson teach that an effusion of blood, or of a yellowish albuminous matter, which constitutes the corpus luteum, takes place between the internal and the external membranes of the Graafian vesicle; whence the yellow body will have its inner face lined by the internal membrane of the vesicle.

From the observations of Baér and Valentin, the yellow body results from the hypertrophy, or a kind of puffing up, of the internal membrane of the vesicle, which throws out a species of vascular processes that serve to fill up the whole cavity of the follicle, excepting at the part occupied by the ovule. In the latter view, as well as in that entertained by Montgomery, the development of the corpus luteum will aid in rupturing the vesicle, by the distension it produces, and will soon after determine the expulsion of the ovule, by pressing it gradually towards the thinnest part.

Both suppose that the *corpus luteum* is completely developed when the vesicular rupture and the discharge of the ovule take place, which, however, appears altogether inadmissible to me. I am convinced to the contrary, from the specimens which M. Raciborsky has had the kindness to show me. In a female, who died during menstruation, I was enabled to prove the recent rupture of a vesicle that was very much hypertrophied; its cavity, however, did not contain a yellow body. This does not, therefore, precede the rupture of the vesicle. In my opinion, M. Raciborsky has perfectly described the phenomena, consecutive to this rupture, in the interesting treatise just published by him (*de la Ponte périodique chez les Femmes et les Mammifères*, 1844); and as his opinions are not as yet very widely disseminated, it may prove useful to publish them in this work:—

"If the ovaries be examined eight, ten, or twelve days after the cessation of the menstrual discharge, a small, rounded tumefaction, surmounted by a red spot like an ecchymosis, and presenting in its

Although for a long time considered by nearly every author as an irrefragable proof of a previous conception, it is at present well known that this body may exist in a virgin girl, provided she has previously menstruated.

Very different opinions have been promulgated as to the mode of formation of the yellow body, as also in regard to the precise period at which it commences.

According to Robert Lee, the mass of this body is formed exteriorly, around the empty capsule of the vesicle, and consequently it has intimate connections with

centre a slight linear fissure, will be found on the surface of one of these organs. The margins of the fissure are agglutinated, even this early, in the majority of cases; but it is still easy to separate them by using lateral tractions. If the ovary be then opened at the ecchymosed spot, the interior will exhibit a pouch, already smaller than the cavity of the vesicle before the rupture, but entirely filled by a clot of blood, which, when placed in alcohol, has the consistence of a solid body, though somewhat spongy in its nature. The clot is usually about the size of a medium cherry, and may be raised from its cavity without difficulty. The parietes of the vesicle exhibit, at this period, a yellowish hue that disappears in spirits of wine. The surface of the internal membrane is at once slightly plaited and downy; the plaiting being produced after the rupture of the vesicle, by the rapid contraction of the highly elastic external membrane, thus throwing the internal one, which is devoid of such elasticity, into folds. The retraction is arrested by the resistance of the clot, then the folds, that existed on the internal membrane, disappear in consequence of the reciprocal adherence, and the cavity diminishes. In the mean while, the most soluble molecules of the clot are absorbed, and then a further retraction of the external tunic takes place. The internal one, continually forced to follow the diminution of the clot, and to become moulded upon it, forms anew a certain number of folds, which are lost in a similar manner by adhering to each other, and thus diminishing the surface of the internal membrane. Afterwards, a new absorption of soluble parts, a further retraction of the tunics, a fresh diminution of the cavity, &c., &c. Whence, at the end of a month, the only remnant of the pouch, that could once have contained a small cherry, is but a little spot, that would hardly enclose its stone."

The internal tunic of the vesicle becomes hypertrophied whilst undergoing the forced plaiting, caused by the incessant retraction of the external one, thus constituting a radiated mass, which, from the imbibition of the coloring principles of the blood, assumes a very characteristic orange-yellow color.

This coloration is not produced, as M. Montgomery and several others supposed, from the deposit of a substance of new formation, either externally to, or within the vesicle, or between the two tunics that constitute its walls, but is simply the result of imbibition. Finally, the absorption of the clot being complete, the two opposed walls of the pouch, in time, approach each other, and thenceforth form a yellowish striated or slate-colored one. The space of four to six months is sufficient to bring the vesicular cavities to that degree of reduction, and authors are most certainly in error in offering the presence of a yellow body in an ovary as the proof of a recent accouchement.

Further, according to Bischoff, it cannot be doubted that the internal face of the vesicle serves as the point of departure. "Because," he observes, "the granular membrane, composed of cells, is found there; and as the mass, recognized at first as the corpus luteum, is likewise formed of cells, it is very certain that the forma-

tion of the latter proceeds from the development of the cells of the granular membrane. But a new exudation is also produced, in which new cells and vessels are developed, and these latter enter into communication with those of the vesicular walls, and thus represent the yellow body.

"Whatever view may be adopted upon the development of the latter (and to me it appears most probable that it results from the hypertrophy and plaiting of the internal membrane of the vesicle), it is, at least, quite certain that it neither wholly precedes, nor follows the exit of the ovule. In fact, although its formation commences in the earliest period of vesicular growth, after the maturity of the ovule, it does not attain its perfect development until long after the vesicular rupture and the escape of the egg."

The presence of the corpus luteum in the ovary has lost much of its importance in the eyes of the medical jurist, who cannot any longer recognize in it the certain sign of a former pregnancy. It simply proves that there has been a rupture of an ovarian vesicle. But as that rupture may be caused by a menstrual excitement, or the venereal orgasm, as well as a fruitful coition, we can evidently draw no conclusion therefrom.

Some authors, it is true, have thought, in the latter case, the yellow body presented characters not found in the other conditions, and they have admitted true and false corpora lutea; but up to the present juncture, there is nothing to authorize such a distinction, and the efforts of the English physicians to establish a differential diagnosis, have merely served to open a way that yet remains to be explored. For a long period, the ligament of the ovary, of which we have already spoken, was considered as a canal destined, like the Fallopian tube, to carry the fecundated ovule to the uterus; but the modern anatomists describe it as a simple ligament. Notwithstanding, we cannot hesitate to acknowledge that, according to the researches of M. Gartner, of Copenhagen, and M. de Blainville, this canal exists pretty constantly in certain quadrupeds—in which, after having traversed the whole length of the uterine wall and the vagina, it is observed to open near the orifice of the latter; and since those researches, N. C. Baudelocque has seen in a female a canal that seemed to be produced by a bifurcation of the Fallopian tube, and which, traversing the whole uterine wall, terminated at the superior part of the vagina, near to the neck. Further, Madame Boivin, and several others, have met with a similar canal; and lastly, Mauriceau and Dulaurens regarded it as having a frequent existence.

The arteries of the ovaries are the spermatic, which come directly from the aorta.

The numberless venous rami that arise from the ovary, form a common trunk, called the spermatic vein, which empties into the vena cava inferior, though sometimes directly into the renal vein.

Numerous lymphatic vessels also arise here. They contribute to the formation of the spermatic plexus, which itself terminates in the lumbar plexus, and thence passes into the thoracic duct.

The nerves come from the great sympathetic.

PART II.

OF GENERATION.

GENERATION is effected in the human species by the contact of the two sexes, furnished with different organs. These sexes are separated, and borne by distinct individuals, the male and the female; whence it is evident that to produce generation there must first be an approach of the sexes. This first act constitutes *copulation*. The object of this approach is the application of the fecundating principle of the male to the germ furnished by the female, that is, to produce a *conception*, or *fecundation*. The ovum having been fecundated, remains, and is developed in the organs of the mother during the whole term of *gestation*. And lastly, at the expiration of a period (which is nearly uniform), the new being is driven out to maintain an existence from its own inherent forces; and this last act has received the name of the *accouchement*, or labour.

We have already described the genital organs of the female; and as regards those of the male, it is unnecessary to engage ourselves with them here. We shall also pass over in silence all that relates to sexual intercourse, and shall speak in detail only of conception, gestation, and more especially of the labour.

BOOK I.

OF CONCEPTION.

CONCEPTION takes place during the approach of the sexes; though, to comprehend this fact, it will first be necessary to ascertain what portions are contributed by each individual, how and where these are brought into contact, and lastly (which is, and probably ever will be, impossible to explain), how, from this contact, a new individual is produced.

The spermatic fluid, a glutinous, consistent, and whitish liquid, secreted by the testicle, is the fecundating principle furnished by the

male. This fluid is heavier than water, and forms with it an emulsion when the two are shook up together; it has a peculiar odor, which has been justly compared to that emitted by bone-filings, or the flower of the chestnut tree; but, according to Wagner, this odor arises rather from the secretory juices with which it is mixed; because the sperm itself, in a state of purity, does not appear to possess any particular smell.

Chemical analysis demonstrates the presence of albumen, the salts of phosphoric and chlorohydric acids, and a peculiar animal substance called *spermatine*.

When examined under the microscope, at a magnifying power of three or four hundred diameters, the spermatic fluid exhibits: 1. A great number of little bodies, lying quite close to each other, and which are still moving with more or less activity if the fluid has been taken from a recently killed animal; these little bodies have been designated as the *spermatic animalcules*, or the *spermatozoa*. 2. Of certain little granular globules, which are sometimes very few in number, at others more numerous, but always less so, however, than the animalcules; Wagner calls them the *spermatic granules*. 3. These two leading elements of the sperm float about in a small quantity of a clear, transparent, and perfectly homogeneous liquid—the *spermatic liquid*. At the time of the ejaculation, this liquid is mixed with a variable quantity of the fluids secreted by the prostate gland and the glands of Cowper, which latter evidently serve merely to lubricate the parts, to render the sperm more fluid, and, consequently, its expulsion the more easy.

The spermatic animalcules attract particular attention by their varied form, their vital properties and development; and further, they are met with in all animals capable of reproduction.

In man they are very small, scarcely surpassing the eightieth or the hundredth of a line in diameter. The body is small, oval, somewhat flattened like an almond, and transparent, having a diameter equal to the three or four hundredth part of a millimetre (.001 of an inch). The tail is filiform, thicker at its origin than at any other part, and is large enough to present clearly its double outline, but towards the extremity it becomes so fine that it cannot be traced, even by means of the highest magnifying power, whence it may be possible that its delicate extremity is still further elongated, and that the spermatozoa may be much longer than they appear.

It is impossible, says Wagner (from whose able works I extract this paragraph), to decide whether the spermatic animalcules have an animal organization, that is, true animals with an independent life, or not; and all that is either known, or plausibly supposed on this point, may be reduced to a few obscure indications, that are wholly insufficient to establish any positive opinion.

The movements by which they are agitated prove nothing, because it is exceedingly difficult to ascertain whether they are voluntary or not. Again, the duration of the movements also varies in the different classes of animals; in the mammiferæ, they have even been observed for twenty-four hours after death.

The spermatozoa do not appear in the human species before the approach of puberty; at this period, the testicles receive a large quantity of blood, and swell up, the parieties of the seminiferous tubes become thicker, their capacity increases, and they are filled with granules; and then some cysts or cells, furnished with globules, begin to form, and finally the spermatozoa appear in these cells. They are always found in the testicles of men of sixty to seventy years of age. Often, indeed, at this age, there are more of them in the vas deferens, though, in general, the vesiculae seminales seem to contain them also.

The germ furnished by the female is evidently existent in the ovary at the marriageable period, and this germ is the ovule. (Vide p. 65 for its description.)

2. It is unnecessary in our day to prove that an absolute contact of the semen of the male with the ovule of the female is indispensable to fecundation, for innumerable experiments upon living animals, and numerous facts observed in the human species, have long since demonstrated that, whenever any obstacle prevents the approach of these two elements, a conception cannot take place. But at what point does this contact occur? Already had the pre-existence of the ovule in the ovary, the occasional existence of ovarian and abdominal pregnancies, the experiments of Nuck and Haighton, which had rendered fecundation impossible by ligating the Fallopian tubes, tended towards the conclusion that it occurred in the ovary; but this fact was not materially demonstrated, and it still needed the definitive proof of finding the spermatozoa on the organ itself. At present, there cannot be a further doubt on this point, for Bischoff has been fortunate enough to see them there. "I had often seen," says he, "living spermatozoa in movement in the vagina, the womb, and the Fallopian tubes of bitches, but, on the 22d of June, 1838, I had the good fortune to perceive one on the ovary itself of a young bitch, in heat for the first time; she was covered on the 21st, at seven o'clock in the evening, and again the following day at two o'clock, P. M., and at the expiration of half an hour, that is, twenty hours after the first copulation, I killed her, and found some living spermatozoa, endowed with very active movements, not only in the vagina, the entire womb and tubes, but even between the fringes of the latter in the peritoneal pouch that surrounds the ovary, and on the surface of this organ itself." And since that period, Wagner and Barry have made the same observations. Now such results evidently prove that fecundation sometimes takes place in the ovary; but are we thence to conclude, that it is only possible in that organ alone?

For if a spontaneous ovulation be now an incontestable fact, may it not be supposed that the ovule, after having left the ovary, can encounter the spermatic fluid and become fecundated, whether it be in the Fallopian tube, or even in the uterine cavity? And unless we admit (what analogy renders improbable) that the ovule, once out of the ovarian vesicle, is not capable of fecundation, we are constrained

to believe that the latter may be accomplished at whatever part of the genital organs the contact takes place.

But the question arises, how does the fluid ejaculated by the male get as far as the ovary? We answer that, in the great majority of cases, it is evident that the sperm, having first reached the uterus, upon the neck of which it was thrown by the membrum virile, travels through the tube until it arrives there. This course is certainly due—1st, to the movements proper of the womb and the tubes; for in the latter, a rapid retraction is observed, following the direction from the vagina towards the ovary, which, of course, is calculated to aid in causing the sperm to travel it; and 2d, to the movements proper of the spermatozoa; which thus of themselves facilitate their own progression. But in certain rare cases, there exists another way of communication between the vagina and the ovary; thus M. de Blainville asserts, that if the vagina of a young sow be examined, a particular conduit may easily be found, which, having its exterior orifices on each side of the meatus urinarius, runs in the thickness of the muscular fibres of the vagina, becomes retracted at the uterine neck, but does not the less continue through the substance of the womb; at first, this canal follows the body of the uterus, then abandons it, and runs in the substance of the broad ligament, parallel to the corresponding angle. But neither M. de Blainville, nor M. Gartner, of Copenhagen (who merely repeated the experiments of the former), have been able to find anything similar to this in the human female.

Analogy however, renders their existence probable in the human species; and this probability acquires additional strength from the recollection of the facts communicated by M. Baudclocque to the Academy of Medicine in 1826, as also those cited by Madame Boivin. Finally, Mauriceau reports that Dulaurens has several times remarked, that the tube having arrived at the angle of the womb, divides into two canals—one, the larger and shorter, is inserted in the fundus uteri, and the other, being somewhat longer, terminates at the neck, near its internal orifice. It is possible the canal may, in such a case, constitute an additional way for the sperm, different from the ordinary passage.

3. This first point being once established, the question naturally arises, what was the influence exercised by the sperm upon the ovule of the female during the contact? Now, numerous experiments clearly prove that the sperm owes its fecundating properties to the presence of the spermatic animalecules, and that, whenever it is deprived of these, it immediately becomes unsuited to its proper function. But, unfortunately, it is far more difficult to ascertain the part acted by the spermatozoa, though there have been three hypotheses started in regard to that subject, deserving our consideration; for example:—

The most ancient one is, that during fecundation they penetrate immediately to the ovule, and are there developed as a miniature embryo, or, at least, they constitute the central nervous system of

the future being. This old opinion has been recently sustained by Barry, who asserts that the ovule of rabbits, when at maturity, is furnished, both before and during fecundation, with a fissure or opening in the vitelline membrane, and once he was even fortunate enough to see a spermatozoon penetrating this fissure.

Again, according to certain authors, the fecundating power does not belong to the spermatozoa, but to the seminal liquid interposed between them. In this hypothesis, the animalcules are the *transporters* of this fluid, and the object of their movements is to conduct it to the ovule.

Lastly, in the opinion of Bory-Saint-Vincent, Valentin, and Bischoff, the spermatozoa are solely destined to maintain the chemical composition of the sperm by their active motions. They suppose that the spermatic fluid is a substance endowed with a chemical sensibility of such a character that, like the blood, it can only preserve the fecundating power while it remains in motion; whence these active elements are enclosed in it, whose presence is indispensable—elements, the movements of which are never more active than just at the moment when the semen leaves the place of its secretion, and which appear to exercise the most favorable influence for the maintenance of its composition.

These are a summary of the most recent opinions; and we merely present them as they are, without any commentaries, not desiring to decide in so delicate a matter. Besides, whichever one may be adopted, the mind remains unsatisfied; for it must be acknowledged there is still a mystery that all the most ingenious hypotheses have not been enabled to clear up, and which will probably escape all our researches.

The Graafian vesicles become very vascular and swell up, both from the hypertrophy of their walls and the augmentation of liquid contained in their interior, at the rutting season of animals, and during the flow of the menses in females. This condition of things results in so great a development after a fruitful coition, and the action of the spermatic liquid on the vesicles, that the latter ultimately give way at their apex on the free surface of the ovary, and thus permit the ovule to escape, together with a portion of the granular matter which surrounded it; at the same time, the Fallopian tubes, which had participated in the state of turgescence along with all the other genital organs, retain their free extremity in contact with the ovary, and the ovule, having escaped from the vesicle, immediately engages in their canal; being pressed onwards by the peristaltic contractions of the tube, it advances step by step through this duct, and finally arrives in the uterine cavity, where its development unceasingly progresses until the regular term of pregnancy. (Vide the chapter on *Ovology*.)

It is extremely difficult, not to say impossible, to fix a precise period at which the fecundated ovule reaches the cavity of the womb. In animals, we may ascertain without difficulty the time of fecundation; but this, of course, is generally impossible in the human species, and this obstacle renders nearly all our observations uncer-

tain and incomplete. Further, very numerous researches have clearly proved that the ovule in mammiferæ does not always arrive at the same moment in the matrix, and it is exceedingly probable that the same variations exist in the human female.

In the present records of our science, there is no one conclusive fact that proves the ovule to have ever been seen in the womb of a woman prior to the tenth or twelfth day after her conception.*

After the exit of the ovule, the Graafian vesicle soon retracts upon itself, and thus contributes to the formation of the corpus luteum, before spoken of (page 69).

We shall hereafter describe the modifications which the ovule undergoes during its passage through the tube, and after its arrival in the uterus.

Conception is an act that takes place unconsciously, and altogether involuntarily; although some females, more especially those who have had children, imagine that they can distinguish a prolific connection, from others. They say a much more voluptuous sensation is then experienced, a spasm much better marked; and I have met with too many females, who acknowledged having made this observation, to believe there is no truth in the assertion.

The same ignorance that prevails as to the causes of fecundation, likewise exists with regard to those opposing its accomplishment. It is wholly impossible to explain why some women are barren, although well formed—why, in a considerable number of cases, married females have not had children during their first marriage, whereas they subsequently became enceinte, when even it has been observed that the first husband had children by a former bed.

The most proper period for fecundation appears to be that immediately following the flow of the menses; thus M. Raciborsky has ascertained that the conception took place a little before or after their appearance, in fifteen females, who could designate precisely the time of the sexual approach. It is indeed evident, that everything seems admirably prepared at this period for the reproduction of the species; but, however, I am far from concluding, as M. Raciborsky has done, that the aptitude for fecundation in the human race is limited to a few days, either preceding or following the menstrual terms; because I believe that the excitation produced by coition may communicate itself to the ovarian vesicles, and cause modifications in them, altogether similar to those experienced in the mensal evolution; and it would be very difficult to affirm that there is any

* Baër examined a woman, who committed suicide eight days after conception: the caducous membrane had commenced forming, and some vessels, coming from the mucous membrane were penetrating it, but he could not detect any trace of the ovule in the uterus. (*British and Foreign New Review*, Jan. 1836, p. 328.) The same occurred in the case cited by Weber (*Disquisitio anatomica uteri et ovariorum puellæ, septimo a conceptione die defunctæ instituta*). Doctor Pockels speaks, it is true, of an ovum of eight days, found in the uterus, and in which the *fœtus could easily be distinguished*; but the description furnished by him evidently applies to a more aged product. (Allen Thompson, in the *Edinburgh Med. and Surg. Journal*, vol. lii. p. 122.) Ovules of eleven days were the youngest observed by M. Velpau.

one period of the year more favorable than others to this function in the human species.

I shall not stop to refute the opinion of those who suppose the sexes can be created at pleasure; although I do not believe that the physical constitution of the husband or wife is wholly devoid of any influence over the sex of the child; for the learned observations of M. Girou appear to me to have proved, in animals at least, that, in proportion as the male is stronger and more vigorous than the female, the greater are the chances of a male offspring, and *vice versâ*; and the observations I have been able to make on the human family since reading the statistical results of M. Girou, have generally confirmed their conclusions.

I here bring to a termination the article on fecundation, in which I have restricted myself (as the reader will see) to a very brief exposition of the opinions generally admitted on this point of physiology; but the size, and more especially the object of this work, compel me to decline entering into more ample details.

BOOK II.

OF GESTATION.

PREGNANCY is the condition of a woman who has conceived, and bears within her womb the product of conception.

This state commences at the instant of fecundation, and terminates with the expulsion of the body which results from that function. It continues for two hundred and seventy days, or nine solar months. This term, however, is not invariable, as it is by no means rare for the pregnancy to terminate sooner, and in some very few instances we find it of longer duration, though some persons have denied this latter fact, and everybody recalls the sharp discussions carried on in France about the middle of the last century, and still more recently in England on the question of retarded births.

We have already stated that the ovule originally exists in the ovary; that a short time before or after conception it is expelled from thence; and that it then traverses the tube, so as to reach the uterus, where it is developed and continues to grow during the whole term of gestation. When the succession takes place in this manner the pregnancy is said to be a *good, normal, or uterine* one; but, on the contrary, if the ovule be arrested at some point of its passage, and is developed elsewhere than in the womb, the pregnancy is denominated *bad, extraordinary, or extra-uterine*. The first, or uterine pregnancy, has been divided into—the *simple*, where only a single foetus exists; the *compound*, or double, triple, &c., where there are two or three children; and the *complicated* pregnancy, or

that in which the positive existence of a foetus is coincident with that of a pathological tumor of the abdomen. Again, the term *false pregnancy* has been improperly applied to certain diseases simulating pregnancy, where this state does not really exist.

CHAPTER I.

OF SIMPLE UTERINE PREGNANCY.

IN pregnancy, there are two orders of phenomena to be studied—those presented by the female, and those which belong to the product of conception. We shall first consider the former.

The history of pregnancy in the female comprises all the anatomical and physiological modifications that are developed in the uterus and all other organs of the economy; the influence that it exerts on the physical, intellectual, and moral health of the individual; and also the means of preventing or curing the troublesome accidents which may result from it.

ARTICLE I.

ANATOMICAL CHANGES.

The most remarkable are those which the uterus undergoes, and we shall commence our description with them.

These modifications may either be in the volume, form, situation, or direction of the womb; and hence, on account of their great importance, we shall successively study them in the body and in the neck; then we will point out the changes which their structure passes through, and afterwards bring into view the relations and physiological properties of the organ.

§ 1. CHANGES IN THE BODY OF THE UTERUS.

A. *Volume*.—During coition, the uterus shares in the spasm of the genital organs, and where the connection is fruitful, this spasm persists much longer than usual, and the consequent sanguinous determination towards these parts sensibly increases, at first the volume of the uterine walls, and subsequently dilates their cavity. This dilatation is also kept up, and even augmented, by the deposit of some plastic and coagulable lymph, which forms, by coagulating (long before the arrival of the ovule), a kind of pouch or vesicle, to which the name of the *caducous membrane* has been applied by ovologists. As soon as the ovule arrives in the womb, the latter begins to develop, and its volume continues to increase until the end of pregnancy, but this progression is not uniform, for, according

to the observations of Desormeaux, it is much slower in the early months, and more rapid in the latter. An accurate idea of this increase may be formed from the following table, which represents the usual dimensions of the uterus at the principal periods of pregnancy.

	Vertical Diameter.	Transverse.	Antero Posterior.
Third month	2 $\frac{3}{4}$ inches	2 $\frac{3}{4}$ inches	2 $\frac{3}{4}$ inches
Fourth " "	3 $\frac{1}{2}$ " "	3 $\frac{1}{2}$ " "	3 $\frac{1}{2}$ " "
Sixth " "	8 $\frac{3}{4}$ " "	6 $\frac{1}{4}$ " "	6 $\frac{1}{4}$ " "
Ninth " "	12 $\frac{1}{2}$ to 14 $\frac{1}{2}$ " "	9 $\frac{1}{2}$ " "	8 $\frac{3}{4}$ to 9 $\frac{1}{4}$ " "

b. *Shape.*—The shape of the uterus changes simultaneously with the alteration in its volume; being flattened, at first, on its two faces, the womb grows rounder and soon becomes pyriform, then spheroidal, and towards the end of pregnancy it has the form of an ovoid, which is slightly flattened from before backwards. The anterior face, however, is much the more convex, and the posterior one is depressed, so as to accommodate itself to the prominence of the lumbar vertebrae.

c. *Situation.*—It is evident that the uterus cannot thus change in shape and size, without undergoing a simultaneous alteration in its position; for example, during the first three months of gestation the womb remains sunken in the excavation, but as its volume increases in all directions, the fundus of the organ rises towards the superior strait, whilst its inferior part and neck subside still more towards the floor of the pelvis. This depression of the organ is produced by its yielding to the laws of gravitation from its own increased weight, as also by the augmented pressure of the intestinal mass upon the larger surface, created by the change in the fundus. Hence, both its increase of volume and its weight, augmented by the pressure of the intestinal mass, which now has an extensive *point d'appui* on the fundus, contribute to produce the first change in position.

At the same time, the uterus remains in the sacral cavity from the greater space found there, and, the fundus being turned a little backwards, causes the neck to advance slightly. Besides, the presence of the rectum on the left most generally obliges the organ to deviate towards the right, and the neck, in a corresponding manner, to the left; consequently, during the first three months, the cervix is directed downwards, forwards, and a little to the left.

About the third month and a half, or the fourth month, the uterus, no longer finding sufficient room in the excavation for its continued development, rises above the superior strait, subsequently to the level of the umbilicus, and reaches towards the end of pregnancy the epigastric region.

In tracing out the gradual elevation of the fundus uteri, it will be found, at the fourth month, to rise two or three fingers' breadth above the pubis; at five months, it is within one finger's breadth of the umbilicus; and from the fifth to the sixth month, it approaches

and passes the umbilical depression, so that at six months it is half an inch above this ring; three fingers' breadth at seven months; and four to five at eight months; it still continues ascending in the commencement of the ninth, but in the last fortnight of gestation, the womb seems to sink down, being, in fact, on a lower level than before. This last is a remarkable occurrence, though it has been said in explanation that the uterus, as if overburdened with the weight of the foetus during the latter period, is pressed in upon itself in a measure, and hence enlarges in the transverse and the antero-posterior diameters. This may be true as regards some females who have previously had children, for not unfrequently they say to us at this time, "It has all gone to the sides;" but I believe a more general explanation of the fact may be given; for, in the great majority of cases, if females be "touched" near the end of pregnancy, a voluminous tumor, occupying the excavation, will be readily felt, which is covered by the inferior and more especially by the anterior part of the uterine body. This is the head of the foetus, which has descended from the impetus of its own weight, the wall of the uterus being pressed before it, and has become engaged in the excavation, sometimes even as low down as the floor of the pelvis.

Now, does not this circumstance, which may be remarked whenever the head presents regularly, and when there is no vice of conformation in the pelvis, furnish us a sufficient reason for the depression of the uterus en masse? Or, in fact, could it be possible that the superior did not follow the descent of the inferior part of the organ?

D. *Direction.*—In passing up into the abdominal cavity, the uterus is obliged to follow the direction of the axis of the superior strait, and being thrown off by the lumbar column, and finding much less resistance from the anterior abdominal wall, it necessarily inclines forward; but, owing to the lumbar projection, it cannot possibly remain on the median line, and hence it leans towards one side of the abdomen, the right one, remarkable as it may seem, at least eight times in ten.

Most authors, since the days of Levret, have endeavored to explain this great frequency of the right lateral obliquity. Levret himself taught, that the uterus always inclines towards the side where the placenta is inserted; for this point, he said, being the thickest and most vascular part of the whole organ, is also the heaviest, and this increased weight, augmented by that of the placenta, must necessarily draw the organ to that side; but experience has shown that the placenta is far from being always inserted on the side towards which the uterus is inclined. Again, according to Desormeaux, the presence of the iliac portion of the colon, which is usually filled with fecal matters, prevents the womb from leaning to the left, when it commences ascending out of the excavation, and thrusts it into the right iliac fossa, whilst the mass of the small intestines is pushed to the left side by the ascent of the womb (where the direction of the mesentery would naturally draw them), and this

contributes both to maintaining and to augmenting the inclination of the uterus to the right. But, as M. Paul Dubois has justly remarked, any influence the colon, placed on the left, may have, is fully compensated by the presence of the cœcum on the right; and, from the observation of M. Velpeau, the mesentery is directed from left to right, and not from right to left, as Desormeaux has it, doubtless by mistake.

The habit of using the right arm, and of lying upon the right side, has also been brought forward in explanation of this right lateral obliquity, but subsequent observation has not sustained the assertion; thus, for instance, in seventy-six females, all of whom had the uterus inclined to the right, thirty-eight rested on the right side, twenty on the left, fourteen alternately on both sides, and four on the back. And we may further remark that, down to the present time, it has not been observed that the uterus is placed upon the left side of the abdomen more frequently in those women who habitually use the left arm than in others.

Madame Boivin, in my estimation, has given the best explanation of this fact; she asserts that the round ligament of the right side is shorter, stronger, and contains more muscular fibres than that of the left, and she attributes the right inclination of the organ to the more powerful action of this ligament.

Professor Cruveilhier thinks that the shortness of the round ligament on the right, is the effect and not the cause of the uterine obliquity; "for I have frequently had occasion," he remarks, "to observe that the shortening which occurred on the left, in left lateral obliquity, was constantly accompanied by a remarkable increase of volume." I must confess that I do not comprehend upon what M. Cruveilhier founds this opinion.

M. Velpeau endeavors to refute this assertion, by saying that then the right angle of the womb should not be as much removed from the inguinal canal as the left, but the contrary is observed: but he commits a slight error here, for the ligaments in question do not terminate in consequence of the development of the uterus at a point corresponding to the lateral borders of the empty organ, but much more in advance,* so that they are inserted on the anterior lateral region of the womb; and further (if the right incli-

* The uterus is developed during pregnancy, at the expense of the posterior wall particularly. The truth of this becomes clearly evident by marking the point at which the tubes are inserted at the end of gestation, when two-fifths of the antero-posterior diameter of the organ will be found in front of, and three-fifths behind this mark.

I examined, with Messrs. Bonami and Helot, the womb of a female who died in the seventh month of pregnancy, under the care of M. Recamier, in whom the round ligaments were inserted so far forward, that four-fifths, at least, of the antero-posterior diameter were behind a transverse line drawn between their points of insertion (April, 1843). In this woman, no obliquity of the uterus existed, and the organ appeared to be near the median line, at least in the dead body. I carefully measured the comparative length of the two round ligaments, and must acknowledge I did not find any difference between them. Should the absence of obliquity, in this case, be attributed to this fact?

nation is due to the traction of the right round ligament, as Madame Boivin teaches), the uterus, in inclining to this side, will naturally make a movement of rotation on its own axis, which carries its anterior plane a little to the right, and its posterior wall somewhat to the left. Now, this is precisely what does take place.

E. *Thickness of the Parietes.*—The earlier authors on this subject entertained very different views concerning it: some, judging the thickness of the body by that of the neck during labour, concluded that the uterus could not be distended without a great diminution in the extent of its walls; others, having had better opportunities of examining the wombs of females who died soon after the accouchement, observed the very considerable thickness exhibited by the uterine parietes at that time, and therefore adopted the opinion that the latter become much thicker during gestation.

Both sides were in error, for numerous autopsies, made since that period, of women who died during gestation, have established the truth of the following propositions, namely:—

1. In the first three months, the uterine walls augment a little, doubtless in consequence of the development of their vascular and muscular apparatus. 2. Towards the fifth month, they are about the same as in the normal state. 3. At term, the parietes are thicker than in the natural condition, at the point corresponding to the insertion of the placenta, thinner at the neck, and they present but very little difference throughout the remainder of their extent.

We may here notice some further exceptions; thus, M. Moreau, having measured the thickness of the walls in a woman deceased at term, found it one-sixth of an inch at the fundus, one-fourth of an inch at the insertion of the placenta, and one-third of an inch at the neck. This singular anomaly may be explained, says M. Moreau, 1st, as regards the thinness of the fundus, by the enormous distension the uterus had undergone (being a twin pregnancy). And 2d, the greater thickness of the neck resulted from the considerable retraction this part had sustained from the escape of the amniotic liquid before death.

In one instance, Saviard found it one-third of an inch at the placental attachment, and only a line in other parts.

My friend, Dr. Ripault, in performing the Cæsarean operation, found the uterine wall only one or two lines thick. I have myself had occasion to examine a pregnant woman, in whom the parts of the infant were so easily distinguished through the abdominal parietes, that the hand seemed to be only separated from them by a layer of a few lines in thickness. Again, the thinness may be partial; thus Hunter describes a uterus, the posterior walls of which exhibited this phenomenon in a remarkable degree.

Since the thickness is not sensibly diminished, it is evident the whole mass of the uterine walls must greatly increase, so much so indeed, that towards the end of gestation, the total weight of the organ reaches two and a half pounds, or even more. The empty uterus, in the case of M. Moreau, just cited, weighed (1750 grammes) nearly four pounds.

F. Density of the Walls.—The uterine parietes, in the non-gravid state, are very hard and resisting, and have nearly the consistence of fibrous tissue, but during pregnancy this density diminishes and the walls become soft and flabby. The ramollissement begins to show itself as early as the first month, and constitutes at that period one of the best signs for proving a commencing pregnancy (vide article on *Diagnosis*—infra), because instead of presenting the fibrous density of the ordinary state, the walls have a clammy softness closely resembling that of caoutchouc softened by ebullition, or that of an oedematous limb. This decrease in the consistence of the uterine walls, constantly advances, so that, at a later period, a light pressure made on the anterior abdominal parietes will easily depress or deform them; consequently, the extremities and other inequalities of the foetus may be detected, and its movements may even cause an elevation of some part or other; the child, therefore, is not placed in a cavity having immovable walls.

The diameters of this cavity will vary with the position taken by the foetus, which can, in some cases, continue to change them down to the end of gestation, the flexibility of the walls permitting its long diameter to pass through the small ones of the organ; and we can readily comprehend how this flexibility, this suppleness of the fibres of the womb, will aid in preventing the disastrous consequences which otherwise might result to the child from any violent blows on the abdomen, or from the shocks experienced by the mother.

§ 2. MODIFICATIONS IN THE NECK OF THE UTERUS.

The modifications which the neck undergoes during pregnancy, are referable either to the consistence of its tissue, its volume, form, situation, or direction; and as the ramollissement of the tissue in the uterine neck seems to be an all-important fact, we therefore give it the first place.

Now, everybody knows that, in the non-gravid state, the uterine tissue resembles the fibrous in its consistence; but immediately after conception, and from the sole fact of the active congestion which the genital organs then experience, this consistence begins to diminish, although, from being coincident with the hypertrophy of the uterine walls, it is scarcely sensible during the first few days, whatever may be the extent of the neck examined. But towards the end of the first month we may ascertain that, independently of this original general modification, the most inferior, or still better, the most superficial part of the os tincæ, begins to soften. It appears rather as a swelling of the mucous membrane than a true "ramollissement" of the proper tissue of the lips; so that by pressing slightly on this thickened membrane the finger first detects a fungous softness, but soon reaches the proper tissue of the neck which still maintains its normal consistence. The sensation then experienced by the finger greatly resembles that communicated when it is pressed on a table covered by a soft and thick cloth, and it is only towards the end of the third, or beginning of the fourth

month, that the lips of the os tincæ are softened throughout their whole thickness to the extent of a line or a line and a half.

At the commencement of the fifth, the ramollissement increases from below upwards, and at the sixth embraces the moiety of the sub-vaginal portion. During the last three months it invades the superior part by degrees, and last of all the ring of the internal orifice in such a manner that, at the end of gestation, the neck is so soft in certain females, that I have frequently observed students to have great difficulty in distinguishing it from the walls of the vagina.

This modification of the neck, which authors have scarcely spoken of, is one of the most important signs; because, after a little experience, it affords us one of the best means for ascertaining the different stages of pregnancy; being constant, and found in all females, unless the neck should be the seat of some pathological alteration. It is worthy of notice, however, that the ramollissement is not so well-marked, and is much slower in its progress in primiparæ, than in women who have previously had children; but in all it steadily proceeds from below upwards.

As before remarked, we may judge very nearly by the extent of softening the probable period of pregnancy, as it progresses from the inferior to the superior part of the neck; though there is one important remark to be made on this subject, namely, that whenever females have had a great number of children, the sub-vaginal portion of the neck loses the greater part of its length; for the extremity projecting into the vagina, (which corresponded to the middle part of the neck, in the first or second pregnancy) does not begin to soften until the period at which it would have undergone this ramollissement, if the neck had preserved its primitive length; whence we may expect to find a great difference in the extent of the softened part, if a comparison be made between the necks in two females, both advanced to the sixth month, one of whom is enciente for the second time, and the other had previously borne ten children. Wherefore it is necessary, in making this appreciation, to bear in mind the number of former pregnancies, as also the real length of the cervix.

2. *Volume.*—Some singular ideas on this subject have been promulgated by many authors, but the following appears to be the most constant rule: the neck doubtless participates in the hypertrophy of the uterine walls during the earlier months, but the extent is far less considerable; the neck becomes thicker and grows more voluminous, especially at the superior part, though I have never observed its elongation to the extent of two inches, as Madame Boivin apparently believes, or to two and three-quarters and three inches, as M. Filugelli has more recently advanced; for, as elsewhere observed, these opinions result, in my estimation, from an error. The neck, in the commencement, being much lower, and directed more in front than in the ordinary condition, the finger can easily explore a larger extent of it, and thus an impression is created of an increase in its length which really does not exist; for frequent post-mortem

examinations of females who died in the early months of pregnancy have convinced me that, even if the neck is increased in thickness, its length does not undergo an appreciable augmentation up to the fifth month.

But at the commencement of this latter period, according to most writers, the cervix begins to diminish. In the sixth month (they say) it begins to spread out at the superior part so as to aid in the enlargement of the body of the womb, and this spreading at the upper part continues to advance in proportion as the term of gestation approaches, and consequently the length of the neck decreases from above downwards, so as merely to present at last, at the close of the ninth month, a ring of variable thickness. In fact, the diagnosis of the different periods was based on this gradual shortening, and, agreeably to the majority of the French accoucheurs, who have adopted the opinions of Desormeaux, the neck has lost at the fifth month about one-third of its length, one-half at the sixth, two-thirds or three-quarters in the seventh, three-fourths or four-fifths in the eighth, and the remainder is effaced during the course of the ninth month; and yet, I do not hesitate to pronounce all this an entire error, which was first pointed out by M. Stoltz, in 1826, and to which I also have constantly asked attention since the year 1839. No; the neck does not shorten in the way which has so long been described; it preserves its whole length until the last fortnight of pregnancy; and it is an easy matter, especially in women who have previously borne children, to verify this remark, as we shall presently demonstrate. But during the last few days, its length, which until that time was intact, diminishes very rapidly, and even disappears by a total effacement, and we shall in due season explain the simple mechanism of this phenomenon.

But to return; I have frequently been enabled to prove, in primiparæ, the truth of M. Stoltz's assertions; for in these women the neck does diminish a little in length, during the last three months, although by a process entirely different from that described by Desormeaux. Thus, towards the seventh month, the ramollissement has invaded the whole intra-vaginal portion; the parietes of the neck, having lost their consistence, are easily separated by the liquids secreted upon their internal face, and the upper part of this portion being turned outwards, enlarges in such a manner as to cause the whole neck to resemble a spindle in its shape; the superior extremity of which is formed by the internal orifice (still closed), and the inferior is constituted by the external one, which is scarcely opened in primiparæ, even at the end of gestation, as we shall hereafter show.

Now, it is easily understood how this bulging of the middle part of the neck can only take place just in proportion as the two ex-

Fig. 16.



A section showing the neck of the uterus; the anterior and posterior lips are seen *in situ*, being separated from each other by the fusiform cavity of the neck.

tremities of the latter approach each other; thus, of course, detracting so much from its total length.

I do not believe, however, with M. Stoltz, that the approximation of the two orifices can be sufficiently marked as to cause a material shortening between them, but it certainly does exist to some extent. What has been said concerning the rapid effacement of the neck in the last few days in multiparae, equally applies to primiparæ; the process taking place by the same mechanism.

3. Form.—The principal modifications in the shape of the neck have already been presented, but they ought to be studied in a more special manner, according to whether they are found in primiparæ, or in women who have previously been mothers.

A. At the commencement, in primiparæ, the cervix appears more contracted and more pointed, resulting, perhaps, from the augmentation of its superior part in volume; the orifice of the os tincæ, which, before conception, presented a simple linear and transverse fissure, now assumes a circular form, constituting, as it were, a small lenticular fossa. A little later, as mentioned above, the middle part of the neck's cavity enlarges, so as to give to the whole cervix the form of a spindle that is somewhat elongated, rather than that of a cone, which it previously had. It continues smooth and polished on the exterior surface, and the periphery of its orifice is rounded, without any irregularities or fissures; sometimes presenting a soft circumference, at others a thin and sharp border; the latter rarely happens, however, before a very advanced stage.

B. The form of the neck is altogether different in women that have had children; thus the inequalities and protuberances exhibited by the inferior part will scarcely permit us to ascertain whether it becomes more pointed or not, and it is equally difficult to determine whether the external orifice has become more rounded; because, having been somewhat patulous before pregnancy, this orifice, in consequence of the variable number of cicatrices found on it, presents a very irregular opening. And the only point capable of demonstration in the early periods is, that the partially opened orifice will dilate still further, so as to admit readily the extremity of the fore-finger.

This spreading out of the os tincæ, and the inferior part of the neck, constantly increases from below upwards, as the gestation progresses; it reaches the middle part of the cervix about the seventh month, and nearly gains the internal orifice by the ninth.

The enlargement of the cavity of the neck advances simultaneously with the softening of its walls; and we can easily prove by experiment that the finger will penetrate deeper each month into this cavity, which resembles a thimble in form in some women, whilst in others it is funnel-shaped, the base being below, the apex above.

The part of the neck not yet softened and dilated constitutes the summit of the cone; that is, every portion of its length contributes in succession; so that the first, and often even the half of the second phalanx of the finger can penetrate into its cavity towards the ninth month, the extremity of the finger being only

arrested by the internal orifice, which is still closed and puckered like the knot of a purse.

Fig. 17.



Fig. 18.



Fig. 19.



These figures show the successive yielding of the cervix uteri as the gestation advances, and how the finger ultimately gets into direct contact with the naked membranes.

The ring at this orifice finally softens and disappears ; it becomes dilated, and permits the finger, which has passed through a canal an inch to an inch and a half in length, formed by the cervix, to come into direct contact with the naked membranes. If the length of the external surface of the neck be compared at this period with the canal in which the finger is introduced, the neck will be found much longer on the internal face than exteriorly, for it is self-evident that the finger is arrested on the outside by the vaginal insertion, whilst within it traverses the whole space between the two orifices.

The internal orifice sometimes opens too soon ; thus Desormeaux declares that he "touched" the membranes at the end of seven months, over a space of an inch and one-third in extent. I also have verified the same fact, but only in women who were subject to floodings, or in those who submit to "the touch," in our public "cours." For, in these latter, the frequently repeated and careless introduction of a great number of fingers, has appeared to me to greatly accelerate the softening and dilatation of the os uteri.

On the whole, therefore, the neck is fusiform in primiparæ, the external orifice is rounded, and so little dilated as to prevent the introduction of the finger without some considerable effort. In females who have had children, the external orifice is widely open, and the cavity in the neck is funnel-shaped, the base being below, and which continues to increase until its apex reaches the internal orifice. This latter remains closed in both, in a vast majority of cases, until the last month of pregnancy.

We have stated that the whole length of the neck disappears at the last, by being confounded with the cavity of the body. The mechanism of this fusion is very simple ; the ring at the internal orifice having at length lost all power of resistance from its ramollissement, opens so as easily to admit the finger's extremity (vide Fig. 19), and this dilatation gradually augments under the influence of those feeble contractions by which the uterus, in the last fortnight of gestation, seems to prelude the labour of childbirth, and as soon as this is sufficiently advanced to permit the inferior part of the

ovum to engage in the cavity of the neck, we can understand that the latter is promptly trespassed upon. Again, there is no projection found at the upper part of the vagina, unless, perhaps, in those who have had children, a collar of variable thickness and softness (circumscribing an opening that is large enough to permit the finger to reach the membranes), and a sharp, thin ring, in primiparæ, in the centre of which is a much more contracted orifice, are encountered.

4. We have but little to remark concerning the situation and direction of the uterine neck during pregnancy, and our opinions do not differ from those held by the majority of writers on this subject; and hence we shall merely state, in a few words, that during the first three months the neck is lower, is directed more in front, and a little to the left, and that this position is the necessary consequence of the inverse movement which the body of the organ performs. Its fundus being carried backwards into the sacral cavity, and pushed to the right by the tumor, which the rectum, habitually distended with fecal matters, forms behind and at the left part of the excavation.

In the last six months, the cervix necessarily following the ascent of the body, mounts upward, and, at the same time, most generally looks backward and to the left, whilst the fundus is nearly always carried forwards and to the right.

I cannot pass over, however, a disposition of the neck occasionally met with at the end of gestation, that sometimes embarrasses persons not familiar with this kind of exploration; namely, in the last month, the head (if that is the presenting part) frequently presses before it, in engaging in the excavation, the anterior-inferior portion of the uterus, and in case the female has a large pelvis, this descends even perhaps down to the inferior floor. The neck will therefore necessarily be carried behind the tumor which then fills the pelvis, and the plane of its orifice will look towards the anterior face of the sacrum, and of course, in order to penetrate its cavity, the finger must be bent like a hook and be introduced from behind directly forwards. This posterior obliquity of the cervix, which differs essentially from that produced by an anteversion of the womb, sometimes renders it very difficult of access, even when the labour is somewhat advanced. The difficulty is still further increased, in some cases, by the softening of the neck throughout, and by its becoming flattened and embedded in this tumor, forming a kind of fold or doubling on its posterior part.

Summary.—From what has been stated, we may now draw the following conclusions:—

1st. That the tissue of the neck becomes softened in the commencement of pregnancy, and the ramollissement, although not very apparent in the earlier months, and limited to the most inferior part, gradually ascends so as to invade successively the whole neck from below upwards, though the softening is much less marked and less rapid in its progress in primiparæ than in other females.

2d. The cavity of the neck dilates simultaneously with the softening of its walls; and further, this enlargement causes it to be spindle-shaped in primiparae; and, in females previously pregnant, to resemble a thimble, the finger of a glove, or a funnel with its base below.

3d. The external orifice remains closed in primiparae, even up to the very term of pregnancy, whilst in others it is widely open and constitutes the base of the funnel.

4th. The whole length of the neck disappears in the last fortnight, being lost in the cavity of the body.

5th. Contrary to the opinions generally adopted before the time of M. Stoltz's publication, the neck preserves its whole length until the last fortnight; and again, it is not shortened from above downwards during the last four months.

§ 3. MODIFICATIONS IN THE TEXTURE AND PROPERTIES OF THE UTERUS.

A. *Texture.*—Among the many changes which the womb undergoes during pregnancy, the most curious of all are those exhibited in its texture; and we shall study these by successively examining the different parts of its constituent elements. And first, of the

Serous Coat.—The peritoneum, forming the external membrane of the uterus, spreads out in all directions, and the various folds formed by it in the neighborhood of the womb (a species of mesentery, as M. Dubois calls them), such as the broad ligaments and the anterior and posterior ligaments, are found double. Many anatomists believe this doubling is even sufficient for the enlargement of the organ. But, to refute this opinion, it is only necessary to examine that portion of it comprised between the commencement of the two tubes, which covers the fundus; for this will afford a convincing proof that it cannot be furnished by the accession of neighboring parts of the peritoneum, because, as Desormeaux remarks, the insertion of the tube and ligament of the ovary upon each side presents an obstacle that will prevent the gliding of the adjacent membrane. The peritoneal tissue, however, undergoes a considerable extension, and a more active nutrition must necessarily take place to prevent its tenuity, since that which covers the uterus during gestation quite equals in its thickness the serous membrane of the unimpregnated state. This increased peritoneal extensibility, without a decrease in thickness, is not a new fact in pathology, and it may be seen in every hernia, if the latter is somewhat enlarged.

The tissue uniting this membrane to the muscular substance appears to have diminished in density, for the peritoneal coat is movable on the fleshy substance, according to M. Dubois, who has met with difficulty from this cause every time he has performed the Cesarean operation.

2. *Mucous Coat.*—The existence of this coat, although denied in the non-gravid state by many anatomists, is very apparent during pregnancy. It becomes more red and villous, and the folds disappear, but this unfolding is not adequate to the enlargement it

undergoes (some writers to the contrary notwithstanding), and, like the peritoneum, it must have a more active nutrition. The mucous follicles grow more apparent, and their secretion is augmented. M. Cruveilhier teaches that the component parts of the mucous membrane separate during gestation, and the vessels are thread-like and greatly increased in number, but the mucous membrane regains its primitive form in proportion as the uterus returns to its first dimensions and the scattered elements rejoin. It seems as if the membrane had been destroyed by a regular exfoliation, and that it is reconstituted of all its pieces, which opinion perfectly accords with the ideas recently promulgated by Messrs. Coste and Sharpey on the nature of the caducous membrane.

Independently of these villosities, found on the internal surface, the uterine mucous membrane likewise has some glands embedded in its thickness, which appear to be continued into the internal muscular layers. I have easily verified this arrangement in a preparation belonging to M. Coste. These glands, called by Weber the utricular ones, resemble little canals, running within and behind the mucous membrane, in a winding course, so as to form a kind of knot, even at times ramifying a little, and opening on the internal face of the membrane.

Like the membrane to which they belong, they undergo a remarkable hypertrophy immediately after conception; and they are considered by many modern authors, as we shall hereafter see, as the principal elements of the caducous membrane (*vide Caducous Membrane*).

3. *Middle Coat.*—The fleshy portion of the organ composed, in the unimpregnated state, of fibres whose structure is so difficult to unravel, becomes much easier of study in pregnancy; for although the muscular nature of its constituent tissue is very doubtful during the former condition, yet in the latter it becomes quite evident. From the able researches of Madame Boivin, the following disposition of these muscular fibres has been determined. She describes two planes of fibres as existing in the body of the uterus—the one exterior, the other interior: the external plane is composed of fibres which run from the middle line outwards and downwards to the inferior third of the organ where they terminate upon, and aid in forming the round ligaments situated there, while the most superior ones are distributed to the Fallopian tubes, and the ligaments of the ovary. An exact idea of the radiated disposition of the external fibrous planes, at the superior and lateral parts of this organ, may be formed by imagining the long hair of the human head to be parted along the whole middle line of the cranium, and then combed smooth on each side in front, and tied very tight opposite each ear.

Another muscular plane is found internally, having an entirely different arrangement; these fibres are circular and situated at the superior angles of the womb. They surround the internal orifice of the tubes (*a a*, Fig. 20), describing concentric circles, at first very small and close, but gradually separating as the distance from the

angles increases, so that the last and largest border upon the median line, and spread out in the direction of its length.

Between these two planes (the external one composed of longitudinal, and the internal one of horizontal fibres) some other muscular fibres are found, but it is impossible to trace their course.

Only a single order of fibres, which are semi-circular in their character, exists at the inferior part. They commence at the median line of this region, and re-unite on the sides near the round ligaments.

I will remark, in terminating this short account of the uterine structure, its great resemblance to that of all the hollow organs, in having, for instance, its longitudinal fibres on the exterior, whilst the circular and horizontal ones are found internally. The fundus uteri is the part particularly concerned in the expulsion of the foetus, and it is there also the muscular apparatus is the most developed; and its disposition is such, that all parts of the uterine surface tend towards the centre during contraction. Lastly, at the inferior part, where the resistance should be least, there are only the horizontal fibres, constituting a sort of sphincter muscle, which may be compared, on more than one account, to the sphincter of the rectum or bladder.

Quite recently M. Deville, adjunct of anatomy to the Faculté de Paris, after having studied the muscular arrangement of the organ in a great number of uteri, taken from females who died a few days after their accouchements, has arrived at some very different results from those previously acknowledged. He has kindly exhibited his dissections to me, and I confess, after an attentive examination, that it were impossible for me not to be of his opinion. This subject, in my estimation, requires a new examination, but whilst awaiting an opportunity of dissecting myself, the preparations of M. Deville appear so satisfactory, that I have obtained a drawing of them, and introduce here the description furnished by that skilful anatomist.

Examined on its external surface, after the removal of the peritoneum and the compact resisting layer that separates this serous coat from the muscular fibres, the uterus

Fig. 20.



Muscular fibres of the uterus. *a a.*
The internal orifices of the Fallopian tubes.

Fig. 21.



The disposition of the muscular fibres on the anterior face of the womb.

seems to be composed of two orders of fibres, which are essentially muscular in character, one being transverse, the other longitudinal.

The transverse fibres arise (attaching a purely descriptive meaning to this word) from three sources; the round ligament, Fallopian tube and the ligament of the ovary, and from the wings of the corresponding broad ligament; and it merely requires the removal of the delicate peritoneal envelop of these organs to bring into view the transverse fibres and to convince one's self of their muscular nature.

The transverse fibres, joined with certain vessels and nerves, constitute the intimate structure of the round and ovarian ligaments, as well as the middle layer of the Fallopian tube, which is, therefore, essentially muscular, just the same as the internal membrane (improperly called the dartos) of all the excretory canals.

The presence of a great number of transverse uterine fibres in the broad ligament, lying in the thickness of its folds, and extending even down to its base, is an important fact to be borne in mind; and the question arises, where do they terminate? But I have not yet been able to determine this in a satisfactory manner. However that point may be, the transverse fibres, coming from these divers origins, spread out in a radiated manner over the whole exterior surface of the uterus, the anterior and posterior ones transversely, or a little downwards in an oblique direction, and the superior, obliquely upwards, so as to cover the organ completely. Near the median line, these fibres are crossed perpendicularly to their course, by a longitudinal fasciculus, more or less sinuous in character, and three-eighths to three-fourths of an inch wide, which arises near the point of union of the body with the neck, ascends upon the fundus of the organ, and descends on the posterior face, to be lost at its inferior part, opposite to, or a little below the point of beginning, that is, near the union of the body with the neck. A positive continuity will be observed between the transverse fibres of each side and the middle longitudinal fasciculus, if the line of contact be carefully examined.

As the transverse fibres arrive near the median line, some curve downwards, others upwards, so as to become longitudinal, and thus constitute the median layer. This is particularly evident at its termination, both in front and behind, for the whole fasciculus divides there into two portions, one of which curves to the right, the other to the left, and becomes continuous with the most inferior transverse fibres of the body.

This continual exchange of the two series of uterine fibres takes

Fig. 22.



The disposition of the muscular fibres on the posterior face of the womb.

place with such great uniformity, that the longitudinal fasciculus has nearly the same thickness everywhere; but if this lamina be more patiently examined, it will only exhibit some very short longitudinal fibres, forming the central part of a letter X, which the uterine fibres describe, as I have verified on many of my preparations, in the following manner:—

Let us take a layer of transverse fibres on the *right* side of the uterus, at the anterior-inferior part (vide Fig. 21); this fasciculus nearly approaches the median line, then curves upwards and becomes confounded with the longitudinal lamina, then, after a vertical course, varying from one-third of an inch to two inches, it again curves to the *left*, to reassume a transverse direction, thus representing a Z, or, still more exactly, a branch of the letter X.

Thus, the longitudinal median layer is produced by the union of the central and vertical branches of the X described by the uterine fibres.

It sometimes happens, however, that the transverse fibres pass directly from right to left, without forming the vertical branch, which fact should be borne in mind, lest this arrangement existing on the surface might give rise to a belief of the absence of a median longitudinal fasciculus, whereas, if the latter is not evident, it will only be necessary to raise carefully this layer of median transverse fibres, to bring it into view. The uterus exhibits the same disposition of muscular fibres on the internal face, which will readily account for the error of Madame Boivin, who described them as circular.

Notable differences, however, exist between the fibres on the two surfaces of the organ. The most remarkable on the exterior (interior?) is the extreme breadth of the longitudinal fasciculus, which covers the whole fundus, extending from the orifice of the Fallopian tube on one side to the same point on the other. When this fasciculus reaches the anterior and posterior faces, it is intersected at right angles by the transverse fibres occupying the lateral portions just below the orifice of the tubes, which act there as on the exterior surface; that is, some of the fibres curve upwards, others downwards, becoming confounded with the longitudinal layer. Lower down, near the junction of the body with the neck, the longitudinal fasciculus is very irregular. Sometimes it exists; sometimes (though more rarely) it does not.

At this point, in fact, the continuation, or inter-crossing of the transverse fibres from one side to the other, occurs in an irregular manner, either forming the vertical branches of an X, or taking an oblique direction, or again going directly across, the fibres preserving a transverse course.

A third layer exists between the two just described, but I am not

Fig. 23.



Shows the inter-crossing of the uterine fibres.

sufficiently acquainted with the disposition of its fibres to give an exact account of them.

All these particular details do not interfere with the general law of *inter-crossing*, or passage of uterine fibres from one side to the other, and in this respect the uterus may justly be ranged in the same class as all the other hollow muscular organs whose structure is also regulated by the fundamental law of *muscular inter-crossing*. Hence it would not be difficult to demonstrate that the human uterus, as just described, approaches in its structure quite as well, perhaps better, to that of the same organ in *mammiferæ*, than the arrangement pointed out by Madame Boivin. But such a discussion would be out of place here.

In conclusion, I will observe, that the same dispositions in the muscular arrangement are found in the neck and inferior part of the body. Inter-crossings occur there also, the fibres passing directly from one side to the other, or becoming more or less oblique at the moment of crossing, and still oftener forming the branches of an *x* with the median vertical parts. This last disposition gives rise to the peculiar formation, which has improperly been called the *arbor vitæ*.

4. *Vascular Apparatus*.—Towards the end of pregnancy, the uterus exhibits an astonishing development of its vascular system. My friend, Dr. Jacquemier, has recently paid much attention to this subject, and I submit the result of his labor. “In studying the development of the vascular system in its whole extent, we shall find, he says, that the augmentation in the size of the arteries only becomes considerable as they approach the uterus. Whilst advancing between the peritoneum and the external face of the organ, and before giving off their first divisions, they dilate and swell up, and then they furnish branches to the anterior and lateral parts, which ramify *ad infinitum*; they are not situated immediately below the peritoneum, but are separated from it by a delicate layer of muscular tissue. All these ramifications anastomose freely and penetrate through to the internal surface, where they generally terminate, but a large number of those, corresponding to the placental insertion, traverse the mucous membrane, and, according to M. Jacquemier, enter the inter-utero placental caducous membrane.

The beautiful injections, which M. Bonami has kindly shown me, evidently prove that these ramifications even penetrate the structure of the cotyledons as far as the foetal face of the placenta. (*Vide Placenta*.)

If the venous trunks be examined, from the point of quitting the uterus to their terminations in the hypogastric vein and in the vena cava inferior, a great increase in capacity will be noticed, for the ovarian veins are almost as large as the external iliacs, and the uterine are but little less. In the substance of the womb, the venous system presents itself as a series of canals, situated in the centre of the muscular tissue, at nearly an equal distance from the internal and the external faces: at this point, the uterus is traversed by a

great number of canals coming from all directions, and anastomosing and forming by their union, some large sinuses, and the whole constituting a grand plexus, several divisions of which will receive the extremity of the little finger.

These canals are much larger opposite the insertion of the placenta than elsewhere, and they diminish in receding from this surface. At one portion (determined by the placental insertion), the uterine venous canals, like the arteries, traverse the mucous membrane to be distributed to the placenta, so that subsequent to the separation of the after-birth, the whole placental surface of the uterus is riddled with holes, as if made by a punch; some of them go nearly an inch beyond this attachment, being produced by the rupture of the utero-placental vessels. (*Vide Placenta.*)

Such an enlargement of the arteries and veins cannot result from a simple unfolding, since they still preserve their flexuosities in a great measure, and therefore these vessels must undergo a transformation, analogous to that of the fleshy tissue. A very delicate, yet distinct web of areolar tissue envelops the uterine arteries. The veins, on the contrary, have only their internal coat, which adheres intimately to the muscular substance, and no valves are found in their interior.

From what has been stated, it is evident that the blood flows to the uterus in very large quantities, and consequently its heat and nutrition are augmented, for such an amount of blood must certainly contribute to the growth of its walls. But the question then arises, is the circulation much more active, as many authors have thought? In reply, it would appear from the late researches of M. Jacquemier, that the venous circulation especially must exhibit an unusual slowness, but I confess the reading of this last part of his memoir, has not convinced me on that point. (*Vide art. Hemorrhage.*)

The lymphatic vessels also acquire a very considerable calibre; they form several planes in the uterine substance, the superficial of which are the most developed, and they divide into two groups—those of the neck, which run to the pelvic ganglia, and those of the body, going to the lumbar ganglia. The hypogastric absorbent trunks, according to Cruikshank, who has described and figured them, are as large as a goose-quill, and the vessels themselves so numerous, that, when injected with mercury, the uterus appears to be a mass of lymphatic vessels; and a common dissection, made a few days after delivery, will even afford convincing proofs of their volume and number.

5. The *nerves* of the womb have, of latter time, been the subject of numerous researches, among others, by Drs. Robert Lee, Jobert, and Rendu. Agreeably to the latter anatomist, whose conclusions closely correspond with those of the English accoucheur, the nerves are derived from three sources: 1st. From the ovarian plexus—few in number, and distributed to the angles and fundus uteri. 2d. From the hypogastric plexus—these are specially destined to the neck; and 3d. Some filaments of the great sympathetic, which accompany the uterine arteries, and are apparently lost upon the

neck and lateral parts of the womb. Among the filaments constituting the ovarian plexus, there are a few which seem to follow the course of the blood-vessels passing near the ovary, and reaching the border of the uterus at its superior part. The filaments then penetrate into its substance along with the vessels—but it is impossible to trace them through the uterine tissue, either from the adherence of the vessels to this tissue, or from the tenuity of the filaments themselves, and the same is true of those accompanying the uterine arteries, which come from the nerves that follow the divisions of the hypogastric artery.

The hypogastric plexus furnishes some nervous filaments as the urethra crosses its anterior part; these nerves are few in number, and ascend along the lateral portions of the neck (but *not* following the vessels), giving off branches here and there which enter the uterine walls, but M. Rendu has not been able to trace them beyond the neck. These nerves differ essentially from the preceding, both in origin and distribution, for they come from a plexus whose branches are not distributed with the vessels, and which has frequent anastomoses with the sacral nerves or *nerves of animal life*.

The whole body of the uterus, therefore, receives the nerves of organic life exclusively, whilst the nervous apparatus of the neck alone has communications with the spinal nerves. Like the lymphatic and sanguineous vessels, the nerves undergo a considerable development during gestation. This remark holds so true that, in the preparations exhibited by Robert Lee to the inspection of the Royal Society, and also in the two figures given by him, large nervous bands are seen below the serous tunic, and these bands are so voluminous that many anatomists have doubted their true structure, and have considered them as being furnished by a gelatinous or cellular membrane, placed between the peritoneum and the muscular coat. Consequently, the uterine nerves do not form an exception (as was for a long time supposed) to the hypertrophy seen in all other parts of the organ during pregnancy—for they likewise are developed in every way, and return after the delivery to their normal size. (Vide, for further details, the memoir of Dr. Robert Lee, “*On the Ganglia and the other Nervous Structures of the Uterus.*”)

B. Properties.—In the ordinary non-gravid state, the sensibility of the uterus is so obscure, that it may be touched, handled roughly, or even cauterized without causing the woman much uneasiness, but it becomes more marked in pregnancy, existing in the neck especially in a high degree, but the body of the organ is nearly insensible. I am well aware that most females are conscious of the child's movements, but how, I ask, are those motions detected, by the abdominal walls, or by the uterine parietes? For I have frequently known women to pass through the whole course of gestation without perceiving them; for instance, I saw one at la Charité in August, 1839, who doubted her pregnancy, although advanced to seven months, because she had not felt the child moving. I subsequently met her several times until the end of October, at which period the accouche-

ment occurred, and although the child was quite strong and healthy, she still declared she had never observed its movements.

There is a kind of relation established or existing between the body and the neck of the uterus, for irritations affecting the latter react upon the fibres of the fundus. Even the premature expulsion of the foetus is often a consequence of contractions produced by excitations of the cervix, and it is owing to this cause, according to Delamotte, that repeated coition has frequently caused an abortion, and that females who are used in our amphitheatres for practicing "the touch," are so often delivered before term.

The uterus acquires some entirely new properties, independent of the sensibility which existed a little before, but became more highly developed during the gestation: I allude to the organic contractility, and the contractility of its tissue. The first is a faculty inherent in the uterine fibres, of contracting upon the body they enclose to effect its expulsion from the cavity; it is a true contraction, precisely similar to that of muscle, and is never developed excepting under the influence of a stimulant or irritant of some kind. The second is a property by which the womb, after having been emptied, returns gradually to its former state, and thereby has its cavity nearly obliterated; its principal function is to cause a great diminution in the calibre of the vessels which ramify in the substance of the uterine walls, and an obliteration of those that have large open mouths on the internal surface of the organ after the separation of the placenta, which would prove a source of fatal hemorrhage to the mother, if nature had not provided against so terrible an accident by this contractility of the tissue.

The exercise of the *organic* contractility is always accompanied in woman by pains; this pain is usually very strong in the human species, but does not exist at all in wild animals, and is only observed to a very feeble degree in our domesticated ones. As a general rule, the uterine contraction is not painful in the different species of animals, unless an accident or some disease renders a greater energy of action necessary on the part of the organ, and the pains then experienced by the female are altogether similar to those of women.

If, therefore, the contraction is only painful accidentally, as it were, in animals, and merely in consequence of a particular morbid condition of the uterine fibre, are we not justified in referring the pain in the human species to the same cause? Now can this predisposition be the result of the refinements of civilization? It would of course be impossible to prove this, but there are strong grounds, at least, for believing that such is the fact, when we reflect that our domestic animals, which, like ourselves, have been translated from their primitive normal condition, suffer much more during parturition than those in a savage state.

This organic contractility resides especially in the fibres of the body; its intensity is exceedingly variable in different females, being very strong in some, and scarcely existing in others, but its energy does not bear a relation to that of the external muscular system, for some strong muscular women have excessively weak con-

tractions during labour, and oftentimes the contrary is observed. The exercise of this function takes place independently of the will, at least, in a great majority of cases, which, indeed, we can readily understand must be the fact, from the origin and nature of the nerves distributed to the body of the uterus, since we have just learned that its fundus receives filaments from the great sympathetic alone. I am well aware the books furnish some cases of women who had the power of suspending the contraction at will, but if these facts have been well observed, they certainly must be very rare. Further, in the examples cited, the voluntary suspension of the pains only occurred in the earlier stages of labour, but became altogether impossible in its latter periods.

It cannot be denied, however, that moral impressions appear to exercise an influence over the uterine contractility; thus, a violent emotion has often sufficed to arouse it long before the ordinary term of gestation, and it is not at all uncommon for the contraction to diminish or disappear for several hours, or even days, under the operation of the same causes. Dewees has known the pains to be suspended in this manner for two weeks in a woman who was greatly affected by his sudden and unexpected arrival.

The exercise of this function is seldom of long duration, lasting for a few seconds only—rarely beyond one or two minutes, and then the organ, which was so strongly contracted and hardened, gradually regains its primitive state, and remains in repose, until, under the influence of the same stimulus, it is again thrown into action. The organic contractility, like all muscular power is expended by a prolonged exercise, and hence we can understand why the pains so often become at once more slow and feeble, or even cease altogether after a prolonged labour. Lastly, the opiates have a marked influence over them; for by employing these preparations, we may suspend the uterine contraction nearly at will, for several hours during labour at term, and indefinitely in a case of premature delivery or abortion.

This contractility may be excited by natural, accidental, or artificial stimuli; thus, all the causes of accouchement constitute the first; the second are those of abortion and premature labour; and the third comprise all irritations whatever of the neck or body of the womb; as electricity, ergot, and, in a word, all the means employed when it is desirable to deplete the organ.

On the contrary, it may be weakened by an over-distension of the uterus, by prolonged contractions, or vivid moral impressions, and, according to the observation of Breschet, by lesions of the spinal marrow.

The *contractility of tissue* exists chiefly in the fibres of the body; agreeably to Dewees, it is seated in the circular ones that constitute the internal plane of the uterine muscular layer especially, and is scarcely observable at the inferior parts, and in the neck. It was certainly a wise provision on the part of Nature to place it in the region where the habitual attachment of the placenta causes a more considerable development of the vascular apparatus. This holds so

true, that it is easy to detect the retracted fundus in the hypogastric region after delivery, as a hard irregular tumor, whilst to the vaginal touch the neck appears soft, flexible, and not the least contracted. Therefore, whenever the placenta is inserted on the neck, a hemorrhage is not only to be dreaded during labour, but also at the time of, and for a short period subsequent to the delivery of the after-birth. In most females, the contractility of tissue accompanies the organic contractility, and these two properties are successively in action at the period of labour, and during the gradual depletion of the uterus. In fact, if after the contraction which has caused the expulsion of a certain part of the body enclosed in the uterine cavity, the walls of this organ did not retract promptly to fill up the void, it would be attributable to an inertia of the womb.

The presence of a foreign body in its cavity, any external or internal irritations acting on the neck and body (such as cold or frictions), and the administration of ergot, are the agents best calculated to awaken or solicit the exercise of this property. The causes which seem to diminish it, are an excessive distension of the organ, a too rapid or a too prolonged labour, &c. &c.

c. *Relations.*—At term, the uterus is in relation—1. In front, with the vagina, the posterior face of the neck and body of the bladder, and superiorly, with the anterior abdominal wall. This last is not always immediate, for occasionally a portion of the intestinal mass slips between the uterus and the ventral parietes, as occurred in the woman upon whom M. Dubois practiced the Cesarean operation in 1839; and, as the professor has remarked, the operator should be very prudent in making his incisions, from the possibility of encountering this anomaly. 2. Behind, with the rectum, sacro-vertebral angle, and vertebral column below, and with the mesentery and intestinal mass above. 3. On the right, with the corresponding side of the pelvis, the iliac vessels, psoas muscle, coecum, and right abdominal wall. 4. On the left, with that part of the pelvis, the iliac vessels and aorta, the sigmoid flexure, the psoas muscles, and the whole body of intestines which separate it from the abdominal wall.

ARTICLE II.

CHANGES IN THE NEIGHBORING PARTS.

We can readily imagine that the strange modifications just studied, do not take place in the uterus without affecting the neighboring parts at the same time, and those influences will next engage our attention.

1. As the uterus gradually rises in the abdomen, its surrounding peritoneum is carried along with it; the folds, called the *broad ligaments*, then disappear, and consequently the Fallopian tubes and ovaries are drawn nearer to the body of the uterus, where they lie very nearly in a vertical direction; the round ligaments are

then composed of short linear fibres, among which a great number of muscular ones, prolongations of those in the uterus, and contractile like them, may be distinguished. M. Velpeau has even been able to recognize and appreciate their contraction in three different females during the efforts of the uterus to expel the after-birth.

2. As the womb and upper part of the vagina are intimately associated, the latter is necessarily shortened as the former enlarges in the early periods of pregnancy, whilst the vagina becomes longer when the womb rises above the superior strait. The venous system in the vaginal walls is considerably developed, owing to the greater activity of their circulation. This dilatation of the veins is doubtless the consequence of a greater vitality in the genital organs, but it is also due in part to the stasis of the blood, which is impeded in its course by the uterine development.

The varicose state, and the nodosities frequently encountered by the finger on the vulva and vagina towards the end of pregnancy (described by M. Deneux under the name of *thrombus*), which certainly predispose females to hemorrhagic accidents, may probably be attributed to the same cause; and this congestion even affects the capillaries; for otherwise it would be difficult for me to explain the livid spots or discolorations resembling wine-lees, presented by the vaginal mucous membrane, and to which attention has again been recently called as affording a sign of pregnancy.* But unfortunately this sign can only be serviceable in a medico-legal case, because in private practice very few females would permit such explorations.

In practicing the "touch," the finger frequently detects some arterial pulsations at the upper part of the vagina, though they are more frequently found on some point of the intra-vaginal portion of the uterus, and are evidently due to the great hypertrophy of the vaginal and uterine arteries. Doctor Osiander, of Gottingen, attaches great importance to this as a diagnostic sign, and has called it the *vaginal pulse*.

It is not uncommon to find the mucous membrane of the vagina covered about the seventh or eighth month, throughout its whole extent, with myriads of little pimples, as large as a pin's head. These small granulations (which I have frequently met with) not only line the vagina, but also cover the neck on its exterior, and even on its interior surface. Now is this to be attributed to an abnormal development of the mucous follicles? I am the more disposed to consider it in this light, because their presence always coincides with a marked increase of the vaginal secretion, and these mucous discharges nearly always flow during pregnancy, in variable

* This discoloration is evidently owing to the greater activity of the circulation in the genital organs, and consequently it ought to be met with in all cases predisposing to a vascular congestion of the genito-urinary apparatus. M. Montgomery has detected it in a female at the menstrual period, and it is a well-known fact, that cattle-breeders ascertain whether an animal is in heat or not, by examining the orifice and internal surface of the vagina, which is nearly as black as ink under such circumstances.

abundance, but the period of their appearance is very uncertain. Usually, however, they are more copious in the advanced stages, and the women then say, "they are losing the milk;" an opinion unworthy of refutation. In some, this flow appears in the early months, then ceases and again reappears several times; though perhaps not at all, or else only at a very late period.

3. The bladder is gradually pushed above the superior strait, the meatus urinarius is drawn out and elongated, and its orifice, from being so high up, is concealed behind the border of the symphysis pubis, thereby rendering the introduction of an instrument very difficult, for the urethral canal is more curved than usual, and the curvature is sometimes so great that the male catheter can more readily be used; because the bladder being strongly pushed forwards, and above the pubis, by the developed uterus, draws this canal upwards, and causes it to be applied against the posterior face of the pubic symphysis, thus producing a curvature of the urethra having its concavity in front. Lastly, as the upper part of this canal is compressed by the enlarged womb, the circulation in its inferior parts is impeded, and the whole tube becomes greatly tumefied. It is placed behind the osseous projection produced by the posterior part of the articular surfaces of the pubis, and these two superposed eminences form a considerable tumor in the interior of the pelvis, and I have frequently known students who were practicing the touch, to be unable to explain the remarkable tumefaction encountered by the finger behind the symphysis.

An annoying vesical tenesmus is often produced by the pressure exercised on the body and neck of the bladder, the female being tormented by frequent ineffectual efforts to urinate; these demands are always very urgent, and are satisfied by the discharge of a few drops of urine, but are again reproduced with equal intensity some minutes after. Some persons, judging from this frequency, have thought the urinary secretion was augmented.

In certain cases, the swelling of the urethral walls, and possibly also the compression they sustain, produces its complete obliteration and renders the catheter necessary.

M. Velpeau avers that he has frequently known the bladder, from the fact of its being more compressed above the fundus than below it during the last fortnight of pregnancy, to produce a tumor in the upper part of the vagina, but I have never been able to verify this statement.

4. The pressure of the uterus upon the vascular trunks which go to, or return from the inferior extremities, genital organs, and orifice of the rectum, interrupts the venous and lymphatic circulation in those parts, whence it frequently happens that a considerable oedema of the limbs and sexual organs is produced, as well as the development of some hemorrhoidal tumors.

5. Pregnant women are habitually constive, and hence a voluminous tumor is formed at the lateral posterior part of the excavation by the rectum distended with fecal matters, whereby the whole intes-

tinal mass is compressed, and oftentimes giving rise to colies and troubles in digestion.

6. The diaphragm being pushed up by the uterus and intestinal mass, has its concavity augmented; so much so, indeed, as to offer a considerable difficulty in respiration.

7. The skin of the abdomen is very much distended, and is marked, especially towards its inferior part, by some streaks of a brown or bluish color, which form parallel curved lines with the convexity towards the pubis and groins. These are very numerous in some women, but in others they scarcely exist; they become paler, but do not disappear altogether after the aecouement; sometimes they are continued even to the upper and internal part of the thighs. The muscles and aponeuroses of the abdominal walls become thinner, the recti muscles are removed from each other, and the aponeurotic space which separates them, instead of being a narrow band as usual, is at least four and a quarter inches wide, on a level with the navel. The umbilical depression gradually disappears, the ring becomes distended, and most generally the skin exhibits a protuberance instead of a pit in its place, and this eminence is particularly well marked when the female exerts herself, owing to the engagement of a small piece of epiploon in it, constituting a temporary hernia.

Very frequently an oblong tumor, a kind of embowlement, takes place on the median line after the delivery, owing to the great separation of these aponeurotic fibres; this is especially evident during any exertion, and it often obliges the woman to wear a bandage.

8. The relaxation of the pelvic symphyses is a frequent occurrence; when existing to a great extent, it constitutes a disease that will be more fully detailed in the pathological history of pregnancy.

9. The *mammæ* (which must also be considered as an appendage to the genital organs) undergo, during gestation, some modifications preparatory to the accomplishment of the great function to which they are destined after the aecouement: thus, in the very commencement, most women find their breasts to become tender and swell up, and with some, this is so constant a sign that they do not hesitate to consider themselves *enceinte* as soon as it is perceptible. The enlargement is frequently attended by certain prickling sensations or positive pains, sometimes even by engorgements of the axillary ganglia. It is by no means uncommon for the swelling to diminish towards the fourth or fifth month, but it reappears again near the end of pregnancy, and is then considerably larger than before. In some women it is accompanied by fever, analogous to the milk fever, and this may even be carried to the extent of producing an inflammatory engorgement of its substance, followed by an abscess. More rarely, the bosom, which was at first slightly enlarged, becomes enfeebled and remains flabby and soft until after delivery. In general, this is an unfortunate circumstance, because, from the observations of my friend Dr. Donné, such women prove very poor nurses, both on account of the bad quality and the small quantity of their milk.

About the end of the second month, according to M. Montgomery, but a little later in my own opinion, the mamma swells, becomes more erectile, more sensitive, and forms a more marked eminence; its color is also deeper. The surrounding skin becomes the seat of a larger afflux of liquid, and almost assumes an emphysematous appearance. This skin is also discolored, exhibiting at first a light yellowish tint, but in the course of the two succeeding months the areola is completed, and the skin of the mamma then presents the following characters:—

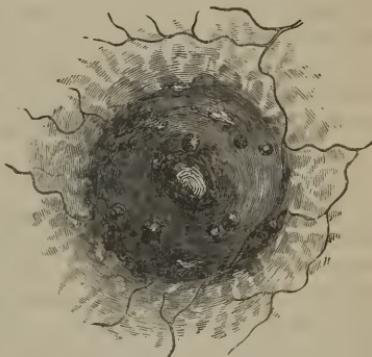
1st. A circle around the nipple, the color of which varies in depth of shade according to the individual, being generally darker in persons who have black hair and eyes, and in brunettes, than in blondes, or in feeble and delicate women. The ring is from three-quarters of an inch, to one inch and a quarter in extent, but, like the intensity of the discoloration, it increases with the advancement of gestation. In the negress, the areola likewise becomes darker.

At the centre of the areola, but more especially at that portion of it which surrounds the base of the nipple, a number of small glandules varying from twelve to twenty, soon appear, and attain an elevation of one to two lines above the cutaneous surface. These little glands apparently have an excretory duct, because, by pressing upon them, a serous, or sero-lactescent liquid may be made to ooze out.

Some small irregularly circular spots begin to show themselves about the fifth month, situated immediately around the areola just described, and resembling the stains created by the aspersion of a colored liquid, thus constituting another spotted and stained areola.

This latter is not so well defined as the first, though not unfrequently it affects a great part of the skin covering the breast. About the same period a number of large venous trunks are seen distributed over the surface of the bosom, and sending numerous ramifications towards the areola, some of which indeed, traverse it. Along the course of these vessels, we may occasionally observe some brilliant lines, closely resembling those found on the skin of the abdomen, though they are more marked in those females whose mammae were but slightly developed prior to conception, and had experienced a sudden increase in size after it, than in others. These silvered trains remain for a longer or shorter period after the accouchement. They are further serviceable in proving that the female has had a child, but they cease to be of any value as a diagnostic sign of her subsequent pregnancies.

Fig. 24.



The areola with the nipple in the centre, surrounded by several little glandules.

Those modifications usually persist during lactation, though where the woman does not suckle her infant they diminish after the delivery, but do not wholly disappear, and consequently, they are more conclusive in primiparae than in others; and although we must not always anticipate their existence in pregnancy, yet, whenever they are found, they constitute an almost certain sign of that condition.

ARTICLE III.

DIAGNOSIS OF PREGNANCY.

The signs of pregnancy are divided into the rational and the sensible.

The first comprise all those characters pointed out by authors as existing in the earliest periods, by which they assert a conception may be justly suspected, and then in the subsequent stages,—the suppression of the menses, the enlargement of the womb, the pouting of the navel, the phenomena just studied in the breasts, the symptoms, or rather the functional disturbances in the digestive organs, the condition of the pulse, the modifications in the urine, and lastly, certain changes that occur in the woman's habits, as well as in her moral and intellectual faculties.

§ 1. RATIONAL SIGNS.

There is some ground for believing the woman has conceived, according to Aristotle, if no fluid oozes out from the vagina after coition, and if the penis is unusually dry when withdrawn; and the opinion seems to be universally received by shepherds, that the retention of the semen is an evidence of impregnation. Agreeably to Hippocrates, the eyes become more sunken, more languishing, and are surrounded by a bluish circle, and spots of different sizes appear on the face. Again, since the days of Democritus, a swelling of the neck is also enumerated as a sign of conception. However, all these symptoms have but little, if any value, and I accord far more importance to the voluptuous sensation, the general erethism experienced by some females during a prolific coition, by which a few of them can recognize with a degree of certainty that they have become *enceinte*.

1. *Suppression of the Menses.*—Females cease to be regular during pregnancy; and this is a law of such general truth, that whenever it occurs in a healthy woman, without a known cause, and not attended with, or followed by any morbid symptom, it is justly regarded as a certain sign of gestation; but as this suppression might be produced by a number of other causes, whenever a physician is consulted about it, he ought carefully to inquire into all the circumstances, past or present, which may have produced such an effect. It would be out of place now to enter into this diagnosis, but we may reiterate an observation, already made by several authors, and which our experience has frequently verified, namely,

that in some young married women, who had hitherto been quite regular, the menses become at once suppressed, and continue so for several months, without any known cause; and this suppression, resulting probably from the irritation or derangement produced in the genital organs by the first conjugal approaches, is frequently accompanied by an augmented volume of the abdomen, and a more exalted sensibility of the mammary glands; and, as the mind so readily believes what it most ardently desires, nothing more than this is wanted to found a hope of a commencing pregnancy. Hence the physician must exercise great discretion in his diagnosis, when consulted on so delicate a subject.

The menses may continue during pregnancy; thus they frequently appear in the earlier months, more rarely during the first five or six months, and still more unusual by far, they exist during the whole term.

Numberless observations of this kind, recorded by authors, prove the truth of these assertions, and we also can bear testimony to the same point; thus, we saw some females in 1837-38, who were evidently pregnant, and in whom the menses flowed at the usual periods, and lasted for the same number of days; one of whom assured us that she menstruated during the first five months, and that her courses appeared on the second of each month, and lasted for two days, just as she had them previously. Again, two females came under my observation at the Hôtel Dieu (whose cases have already been published in my thesis), who were regular throughout the whole term of pregnancy, and Haller and Mauriceau likewise cite similar cases; but notwithstanding all this, some accoucheurs still deny that women can be regular whilst pregnant.

M. Moreau, who professes this belief, has, however, often known females to have sanguineous discharges at variable periods during gestation, but the irregularity of their appearance, the qualities of the blood itself, and its excess or diminution, serve to distinguish these (in his estimation) from a true menstrual discharge. The remark of M. Moreau is certainly applicable to many cases, but the instances above cited, and numbers of others that might be quoted from various writers, do not permit me to entertain a doubt that a woman may menstruate during pregnancy, and that on the other hand females may become *enceinte* without ever having had their menses,*

* A young woman presented all the signs of pregnancy, and although she had never menstruated previous to that period, her courses then appeared and continued during the whole of gestation. (*Perfect, Cases in Midwifery*, vol. ii. p. 71.)

A lady, aged twenty-four years, eight of which she had been married, was never regular except during pregnancy, and each appearance of her menses proved to be a certain sign that she was *enceinte*.

A woman, who married at twenty-one, had never been regular; two years afterwards she experienced some cardiac distress, and the flow appeared. Nine months subsequently, she was delivered of a healthy child, notwithstanding the menses did not fail to appear every month. (Churchill, *Observ. on the Diseases of Pregnancy*, p. 36.)

and the same is true of those who have had them suppressed either by accident or from the progress of age.*

Deventer, Baudelocque, and Chambon furnish accounts of women who were only regular during gestation; the case cited by Deventer is particularly curious, from the opportunity he had of observing this fact in four successive pregnancies of the same woman. Finally, Desormeaux believes from his observations, that in certain years, and often without any apparent cause, a greater number of women have their menses in gestation, even where they were completely suppressed during former pregnancies.

Does this result, as he appears to think, from atmospheric influence, or is it pure chance? For my part, I am unable to decide the question.

2. *Enlargement of the Belly.*—So many different circumstances may cause an augmentation in the size of the abdomen, that but little value can be attached to this sign. However, there is something peculiar in its shape and mode of development in gestation; thus, the abdomen swells somewhat the first month, but this is owing to a collection of gas in the intestinal cavity, which, after remaining a few weeks, diminishes and disappears, whence the woman often seems smaller at the end of the second month than during the first, but whenever this slight tympanitis is not manifested, the abdomen is flatter the first month than before, probably because the uterus settles down in the excavation. At the beginning of the third month, or at three months and a half, the hypogastric region evidently becomes more salient, and the enlargement is thenceforth regular and always increasing until term. Consequently, the tumefaction begins to show itself just above the symphysis pubis, being more considerable at first on the median line than elsewhere, while the sides appear flattened; after the fourth month, the upper extremity of the uterine tumor may be clearly perceived through the abdominal wall, especially in thin subjects, by placing the woman on her back and the abdominal muscles in a state of relaxation; but if the parietes be thick and tense, the palpation (practiced in the manner hereafter described) will become necessary to ascertain this point. The modifications in the size of the abdomen, at different

* Dr. Fleehner, of Vienna, relates that a young woman of twenty-two, had always been regular, but the menses never reappeared after the first accouchement, being replaced each month by an intense headache, accompanied with a feeling of oppression and heat in the forehead and parietal regions. During the succeeding thirteen years, she gave birth to six healthy children. (*Gaz. Méd.*, p. 91, 1841.)

Deweese states, that a woman who had been married for several months, suffered some gastric distress. She had never been regular but three times, and for a number of years there was a complete suppression. He directed rhubarb pills, which purged her slightly, but did not relieve her; six months afterwards, the abdomen being somewhat enlarged, he was enabled to ascertain that she was six months advanced in pregnancy; and soon after, the menses returned, and continued regularly until term. During lactation, which lasted a year, the courses did not appear; she then weaned the child, and in a short period, again became regular, and this, like the former, was the announcement of a new pregnancy.

periods of gestation, have already been described; but its development is not always regular, being, for instance, much more rapid in twin pregnancies, and in dropsies of the amnios than in other cases. Besides, the relation between the volume of the abdomen and the stage of pregnancy, is not always maintained; thus, some women are no larger at seven or eight months than others at five, owing either to their high stature, their breadth of pelvis, or to the small degree of projection in the vertebral column and upper part of the sacrum. On the contrary, in small women, more especially in those having a contracted pelvis, and in whom the womb is therefore necessarily raised, during the early months, above the superior strait, the abdominal protuberance is premature, if I may so express it, and is much better marked at quite an early period than ordinary.

The *umbilical depression* appears more sunken at first, its bottom seeming drawn downwards and backwards, probably by the descent of the uterus into the excavation, which draws down the fundus vesicæ with it, and consequently renders the urachus tense. The circumference of the ring becomes, at the same time, the seat of a distressing feeling of weight, and is more sensitive to pressure, and this sensibility is sometimes extended over a considerable portion of the abdominal wall. But about the end of the third month, that is, as soon as the uterus gets above the superior strait, the umbilicus resumes its normal condition; at the fourth month, it is less hollow than before conception—then its bottom becomes more and more superficial during the fifth and the sixth, and the whole depression is effaced, and is found on the same level as the skin by the seventh month, and in some cases, the umbilical ring is sufficiently dilated to receive the end of a finger; finally, in the last two months, the navel forms a protuberance. Not unfrequently, small portions of the epiploon become engaged during the woman's exertions, in the ring, and thus constitute a hernia on its exterior.

These umbilical modifications afford us a rational sign of great value, because they are constant, and though any pathological tumor of a large size, or a great collection of liquids in the peritoneum, may produce them, yet it is equally true they must always exist in advanced pregnancy, and their absence is conclusive against a fœtus at seven or eight months.

3. The phenomena exhibited in the mammae furnish, as M. Montgomery believes, a *certain sign* of pregnancy. Smellie and Hunter also considered the changes in the areola as a positive evidence of this condition, and the latter surgeon did not hesitate, when examining a dead body, to declare the uterus in a state of development by the product of conception, from this sole indication; as the examination proceeded, the hymen was found still intact, but even this did not change his opinion; and when the womb was opened, its correctness was fully confirmed; notwithstanding which these authors have certainly overrated the importance of these signs, for either of them may fail. Thus, in 1837, I saw a strong and vigorous young brunette at la Clinique, who had advanced to the end of gestation, without any

of the indicated marks appearing around the nipple, and I have since made the same observation on several different occasions. These cases, however, are rare, and I should diagnosticate the existence of pregnancy, with a degree of confidence, in a young woman who had never borne children, and whose breasts presented both a brownish-colored areola, the tubercles, and the freckled characters before described. But in those who have had children, it is very difficult to determine whether these signs result from the modifications of the breast in former pregnancies, or from a new conception, and in such cases, we should rely upon the testimony of the women themselves on this point, and more especially if a short time only has elapsed between the last and the present gestation.

4. I have never been able to estimate the reputed value of the signs, founded on the condition of the pulse in pregnant women, for although it has always appeared more developed, full and harder, yet I could prove nothing beyond this.

The disorders in digestion as well as of the moral and intellectual faculties, belong rather to the pathology of gestation, and will be studied hereafter.

5. *Modifications in the Urine.*—For several years past, the attention of a number of physicians has been directed to the particular modifications exhibited by the urine of pregnant women. Thus, M. Nauche, and after him, Messrs. Equisier and Tanchou, in France, Doctor Letheby, in England (*London Med. Gazette*, December, 1841), and Mr. Stark (*The Edinburgh Med. and Surg. Journal*, January, 1842), and Dr. Elisha Kane, in America (*Am. Journal of the Medical Sciences*, July, 1842), have already submitted the result of their observations to the public, and have all drawn the conclusion that pregnancy may be detected by the inspection of the urine alone. This question, however, is not of such recent origin as many seem to believe, because several of the ancient authors, Avicenna in particular, had previously described the characteristics of this fluid in gestation, and their writings frequently exhibit a special attention to the subject. But we may add, that their observations were far less precise, and in fact had become altogether forgotten when M. Nauche undertook his researches. And we shall now present the principal of the results recently obtained:—

If the urine of a pregnant woman be received in a wineglass, and then be permitted to settle in a light airy place, the following peculiarities will be observed: When first excreted, the urine is acid, whitish, and somewhat clouded, and of a nauseous odor; frequently little white corpuscles, readily distinguishable by a glass, are held in suspension, but, in a few moments, these subside in the form of cloudy flakes, either on the bottom or sides of the glass, the urine meanwhile becoming more limpid and transparent. Agreeably to the observations of Dr. Kane, this primary deposit does not always occur, nor is it peculiar to the pregnant state, for it cannot be distinguished from the mucous deposits so often seen in the ordinary

urine. No change is visible on the surface during this period, but, in the course of eighteen or twenty-four hours, a number of small, brilliant, crystalline granules, irregularly isolated, appear there, in the majority of cases; and in some instances, these granulations unite so as to constitute a thin, transparent layer, which is only visible in certain positions.

The urine remains in that state for several days, though soon beginning to manifest the peculiar signs of gestation: thus, upon the second day, or during the course of the third, according to M. Eguisier, sometimes sooner, but rarely later, its transparency diminishes, the original clouded appearance returns, the odor becomes stronger, and a pellicle may be discerned forming, at first like a nebulous train, but soon acquiring larger dimensions. All of these characters are more evident on the third and fourth days, and some small debris fall from the pellicle to the bottom of the glass. By the fifth or sixth day the pellicle is almost entirely destroyed, its debris subsiding in the sediment form a white crust there; it is replaced successively by a new pellicle, less white than the former, and studded with little brilliant points having a crystalline lustre, and a greenish tint now supplants the milky appearance. In the few succeeding days, the urine evaporates more and more, becomes thicker, and is greener; putrefaction now begins, and the second pellicle is destroyed in turn to make room for the third, which is more or less analogous to that formed on ordinary urine.

Dr. Kane, who has observed these changes almost hourly, furnishes the following account of their progress: The pellicle appears at a variable period; I have seen it sometimes at the end of thirty-six hours—at others, as late as the eighth day; it is scarcely perceptible at first, but soon a light cloud of a milky or bluish-white appearance is seen at the centre or sides of the glass; at the beginning, in some cases, it is uniformly deposited on the surface, constituting there a transparent layer, which becomes more and more distinct; at other times, it is not so well characterized in the early stages, presenting only a few striated, irregular circular lines, resembling a web, but these *striæ* become condensed, and about the fifth day are resolved into a true pellicle.

Again, it exists as an opaline, milky layer, having a slight yellowish tinge, that gradually becomes deeper; the external surface is rendered unequal and ragged by the presence of small granulations, which are whiter in color, and are crystalline, the pellicle resembling the layer of fat that floats on the surface of cold broth, and it retains these characters for a long time. On the subsequent days the sides of the glass are covered with small whitish streaks, varying from a line to a fourth of an inch in extent, which attest the pellicle's descent during the evaporation. The pellicle, especially when thick, gives off a strong cheesy odor, according to Dr. Bird, and will thus facilitate the diagnosis; but Dr. Kane has only verified this observation in seven cases out of twenty-five, and he has not remarked that any relation exists between the pellicle's thickness and the intensity of the odor.

After standing several days, the pellicle seems to give way at the centre, and fissures extend somewhat later from this point towards the circumference, and the debris separate in particles and fall to the bottom. The pellicle thus diminishes in thickness, but it seldom disappears altogether before the putrefaction of the liquid takes place; and the primary deposit at the bottom is thus increased by all the detached portions of pellicle, which gradually settle down.

The substance forming the pellicle has been denominated *kiesteine* (from *κιστης, εως*, gestation), the product of pregnancy, by M. Nauche. The globules, held in suspension when the urine is excreted, gradually aggregate, mount to the surface, and constitute the pellicle above described. This pellicle rarely fails to develop itself in the urine of lying-in women; thus, for instance, in eighty-five cases examined by Dr. Kane, sixty-eight presented all its characteristics, in eleven they were not well-marked, and in six only it failed to appear. One of the last six had a mammary abscess, and was convalescent from typhoid fever; another was very much enfeebled by previous hemorrhages, and only four could be regarded as true exceptions to the rule.

The urine of healthy women, who are not pregnant, exhibits nothing similar to this, and if at any time it furnishes a pellicle, the latter has not the distinctive characters of kiesteine. In certain pathological conditions the urine is covered by a pellicle, which might prove a source of error, although the kiesteine can readily be distinguished from it by the period of formation, independently of those characters before described; for instance, the pellicle which occasionally forms on the urine of persons laboring under phthisis, articular maladies, vesical catarrh, or a metastatic abscess, does not appear before the fifth or sixth day, that is, at about the period when putrefaction begins, and having once commenced, its development is completed in the course of a few hours; whereas the true kiesteine appears on the second day, is then developed but very slowly, and apparently quite independent of putrefaction. Again, this latter has a greater specific gravity than that produced by any pathological state whatever.

The chemical characters of kiesteine will serve to distinguish it from all the mucous or albuminous matters found in the urine. These properties, agreeably to M. Eguisier, are nearly all negative; thus, it is neuter, insoluble in alcohol, ether, water, and ammonia, and, unlike albumen, it is not soluble in alkaline fluids, nor, like mucus, in a mixture of soap and ammonia, neither in boiling alcohol and ether like fat. Further, the urine containing it will not coagulate by boiling as albuminous urine does, but deposits a copious white powder on cooling; nor will it coagulate by the addition of acetic acid.

Kiesteine has, however, many of the properties of these substances; for, being evidently of an organic nature, it is precipitated by the deuto-chloride of mercury, by most strong acids, and the astringent solutions. Finally, in the present state of our knowledge,

we must consider it as a new body, the nature of which is described by Bonastre and Nauche as being gelatino-albuminous.

Although these several writers agree very nearly in the physical and chemical properties of kiesteine, they differ widely as to their microscopical results: thus, Eguisier, Golding Bird, Kane, and Donné, disagree in regard to the form, size, and number of the globules, but happily, the signs we have just furnished amply suffice to establish the presence or absence of kiesteine in the urine, and enable us to wait patiently until the microscopists can agree in their observations. Perhaps this agreement might more easily be effected, if they would lay aside all preconceived ideas on the cause of kiesteine.

The most difficult point of the subject to determine is the following: To what is the presence of kiesteine in the urine of pregnant females to be attributed?

After having endeavored to prove that it could not result from a particular action in the kidney, from the functional derangement of the respiratory apparatus, from any modification whatever in the digestive action, or from the new functions of the mammary glands, M. Eguisier concluded that it must be owing to the passage of the amniotic liquor, or a part of its elements, into the urine, and he thought that the two following propositions (which are more fully detailed in his memoir) proved the correctness of his conclusions, in a satisfactory manner, namely:—

A. There is a continual exhalation and absorption going on upon the external face of the amnios, the products of which are removed from the organism through the urinary passages.

B. The admixture of a certain quantity of the liquor amnii with the urine of a healthy person (though not pregnant), confers upon the latter many of the properties of kiesteinic urine.

The truth of this proposition being admitted, it readily explains, he says, why the urine only begins to be charged with it at a period when the amniotic liquor is abundant enough for us to suppose that its passage into the urine would be appreciable; why the kiesteinic characters are not so evident at the end of gestation, a period when the liquor amnii is less abundant, or less charged with animal matters; and why they suddenly disappear after the evacuation of the waters.

But Dr. Kane does not admit this explanation, plausible as it seems; for he believes that the kiesteine is intimately associated with the lacteal secretion, and appears to attribute it to a "melange" of milk with the urine. "In fact," he continues, "I have frequently proved the presence of kiesteine in the urine, at different periods of lactation (notwithstanding the formal proposition of M. Eguisier); for in forty-four suckling women, out of ninety-four, the perfect kiesteinic pellicle was developed, with all the characters it exhibits during gestation; and it was nearly always in those cases where the flow of milk is limited, or rendered difficult by some particular circumstance, and in which the breasts were consequently more or less engorged, that kiesteine appeared in the urine, but it was found

much more rarely whenever the mother nursed her infant, and her breasts were properly drawn. In a word, the existence of kisteine during pregnancy, and even after the accouchement, up to the establishment of the mammary secretion, its rare existence pending lactation, and its reappearance, when the latter is suspended or impeded, at the time of weaning, for instance, establish an intimate relation between the functions of the mammae and the kiestcnic urine. Dr. Golding Bird adopts nearly a similar view.

Hence, from the observations of writers, it would seem that the period at which this principle appears in the urine of pregnant women, is exceedingly variable. The characters pointed out, remarks M. Eguisier, habitually appear in the course of the second month, and acquire their greatest development from the third to the sixth; from the seventh month they seem to diminish continually in intensity until term, so that in the course of the ninth, and even at times in the eighth month, they are scarcely more marked than at the second.

M. Tanchou has observed it in women who have failed but once in their menstruation. In one instance, Dr. Kane detected it before the fourth, and in another prior to the fifth week, and frequently before the end of the third month. (Dr. Elisha Kane, *Amer. Journ. of Med. Sci.*, July, 1842.)

In fine, the reader will perceive that no one of the *rational* signs, whose diagnostic value has just been studied, is conclusive when taken singly; excepting, however, the modifications exhibited by the mammae and those found in the urine, which are both of great importance. As to the others, circumstances must govern us; though, when all, or several of those signs are found united, they furnish a sum of probabilities that is nearly equivalent to a certainty. And the perception of the *sensible* signs will then serve to relieve the mind from all doubts on this subject.

§ 2. SENSIBLE SIGNS.

All the sensible signs of pregnancy are derived either from auscultation or the "touch." Hence, we must carefully study these two means of exploration, as well as the results furnished by them.

A. *Of the Touch.*—The *touch* (considered in an obstetrical sense) is the art of ascertaining the condition of the various hard and soft parts in the female, which contribute to the great act of reproduction; and it consists in the exploration of those parts by aid of the finger and hand applied to the vulva, vagina, and rectum, or upon the abdomen.

The touch is practiced under various circumstances, for the purpose of ascertaining the existence and stage of the gestation, the imminence of an approaching accouchement, the progress of the travail, the presentation and position of the foetus, the nature and energy, or the feebleness of the contractions, and the character, volume, and situation of those obstacles presented by the hard or soft parts, which might prevent the spontaneous termination of labour, and demand the resources of art. Every instant of the accoucheur's life may require the employment of this mean, and this

alone is an evidence of its great importance, and of the necessity for exercising it. With some address, every one, whatever be the shape or size of his finger, may acquire a sufficient degree of perfection in the touch, to extricate himself from the most difficult cases in practice.

Let no student, therefore, be disheartened by the difficulties met at the commencement, or by the groundless fears of too short a finger, for *this becomes longer by exercising the touch*; and those pedants are unworthy of credence, who seize a hand, and after examining it gravely, reject it with disdain, crying out, "You will never be an accoucheur with such a hand as that." Women, generally, have shorter fingers than ourselves, yet, notwithstanding, they become very perfect in this art, and I repeat, that, unless there is a malformation of the hand or fingers, anybody may learn by practice to touch, and to touch well.

The touch comprises both the vaginal exploration and that of the rectum, and the abdominal palpation.

1. *Vaginal Touch*.—The index finger is usually employed for this purpose; after being extended, it is entered horizontally in the fissure between the nates, until arrested by the soft parts, and the index is then drawn forwards, as far as the opening of the vulva. I prefer this method to the one performed by carrying the finger from before backwards, in such a manner as to pass over the clitoris and the meatus urinarius, because friction against these parts should always be avoided with the greatest care. In bringing the finger from behind forwards, it would not be possible to confound the anal orifice with the vaginal opening, unless by the grossest negligence; and this being once found, the index is first pressed almost directly backwards, until one-third of it has penetrated into the vagina, and then by strongly depressing the wrist, the operator gives his finger a nearly vertical direction, so that the thumb be applied against the anterior face of the symphysis, the radial border of the index be directed in front, and its cubital border be placed against the anterior perineal commissure, which it serves to push backwards. The other three fingers vary in position, according to the case, and more especially to the object in view; for example, if desirable to explore the parts situated on the posterior plane of the excavation with the index, it is better, in my opinion, to extend them on the perineum, pressing the latter up by the radial border of the medius; but if, on the other hand, we wish to perform the ballottement, or to explore the parts on the anterior plane, it will be more convenient to flex the thumb and the other three fingers into the palm, the index alone being extended, with its palmar portion directed in front. Stein directs the medius to be joined with the forefinger, but this is generally useless, and often inconvenient, for although the two fingers may possibly penetrate a little deeper, the sensation is not so clear as that obtained by one.

Physicians should accustom themselves to touching with both hands, for there are some diseases of women, and some positions of the foetus, which compel the accoucheur to use the left hand. Or, it

may also happen that a wound upon the right, will necessarily require the left to be substituted, though, for all ordinary purposes, the right is sufficient.

The woman should be placed either in the erect, or the recumbent position during the examination, according to circumstances. In the commencement of pregnancy, it is better, as a general rule, to have her lying down; because, in this position, the head being propped up, and the inferior extremities flexed and separated, the abdominal muscles are thrown into a state of relaxation, and thus the development of the uterus can more easily be determined. Again, such diseases as prevent the female from standing erect, may also require the same posture. But at a more advanced period, both positions may be used indifferently, though most frequently the ballottement can be accomplished better while the woman is standing. In this latter case, her loins should lean against a wall or some piece of furniture, and a chair must be placed at each side for her hands to rest upon, and the upper part of her body is to be slightly flexed forward.

Where any difficulties are encountered in the exploration, it is advisable to touch in both positions, but, before operating, the accoucheur ought to anoint his finger with some greasy substance, fat, butter, oil, mucilage, &c., for the double object of rendering the introduction easier and less painful to the woman, and to protect himself from the contagion of any diseases she may be affected with.

When the female is standing, he should place himself before her, resting on one knee—in my opinion, it is not wholly immaterial which—for, as a general rule, the knee opposite to the operating hand is preferable, because the other one will then furnish a point of support for the elbow to lean upon; though, if the woman be very short, it would be better to flex the right knee, if the right hand is used.

When the patient is recumbent, the accoucheur places himself at her side, the right one, if he intends using the right hand, and on the left, if the other is to be employed. One hand is then placed upon the abdomen, while the other is engaged in the vaginal exploration; and this precaution is especially advisable, when the ballottement is practised, in order to fix the fundus uteri, and keep it steady. In passing the finger over the perineum, and before entering the vagina, we ascertain the presence or absence of the fourchette, or the inequalities that supply its place after a labour; and it is necessary, as the index enters the vagina, to examine the condition of the external labia, the length and width of the vagina, its mucous membrane, whether smooth or rugous, the various diseases, tumors, or degenerations that may exist on the surface or in the substance of its walls, and the condition of the rectum, whether full or otherwise. (Hereafter, we shall have occasion to speak of this process as a means of diagnosis in the various vices of conformation.) All these explorations being made, the next step is to examine the neck of the uterus, and learn its modifications in form, consist-

ence, or the dimensions of its cavity; all which have been carefully described (vide page 87). The finger may detect the development of the body of this organ, by ascertaining the spreading out of its inferior part, for the womb is wholly within the excavation towards the third month, the volume having at that early period increased sufficiently to occupy all the true pelvis; but the mobility is very small, in consequence of its restrained position, whilst, in the ordinary unimpregnated state, it may be carried to the right or left, forwards or backwards, simply by placing the finger under the neck. During pregnancy, the restraint of the body renders the neck immovable, so that it becomes impossible, or at least very difficult, to produce such motions, and the uterus will also be found much heavier, if an attempt be made to move it.

2. *Abdominal Palpation.*—The abdominal exploration, says Schmitt, contributes greatly towards correct diagnosis, and should always be resorted to when it is desirable to ascertain whether there is an existing pregnancy; and often, indeed, it is more instructive, and furnishes more certain results, than the internal examination. Notwithstanding, some obstacles are met with in this mode of research; for instance, the abdominal walls may be too thick, or there may be a great tension of the flat muscles, or a constant pain located in the hypogastric region which prevents all pressure in that vicinity, but the last two obstacles, being always temporary, are obviated by a second exploration at a more favorable period, though it is often quite impossible to overcome the first. These obstacles are of rare occurrence, the examination generally being quite easy, owing to the flexibility of the ventral parietes.

In order to practice it, the female must lie down in such a manner as to elevate her hips, the head being flexed on the chest, and the thighs upon the abdomen; in a word, so that the abdominal muscles may be completely relaxed. The abdomen is first examined in this position by both hands, with a view of ascertaining its form, size, tension, resistance, and hardness, more especially in the sub-umbilical region.

In the earlier months of gestation, if the parietes are not too thick, a round tumor can be recognized, fleshy in its consistence and evidently rising out of the pelvis, sometimes on the middle, and at others a little towards the right or the left side; this tumor seems to be more elevated above the pubis during the first two months, than in the course of the third, which fact is readily explained by the depression of the organ, on account of its increasing weight and volume; the womb constitutes this tumor, and during the rest of gestation, it rises gradually toward the epigastrium. It is often necessary to ascertain the exact extent of its elevation, so as to form an idea of the probable period of the approaching accouchement, and in my estimation, the following is the best mode of accomplishing this: Place the ends of the eight fingers immediately above the symphysis, and then continue to ascend gradually, so long as the fingers feel any resistance, for when the fundus uteri is gained, the

resistance suddenly ceases, and the fingers sink deeper, by gliding over the convexity, which is recognized there without difficulty.

At first, the uterine tumor is quite resistant, but becoming less so as the gestation advances, though it may be distinguished by the subjoined characters: 1. It always remains circumscribed, retaining its oval form. 2. It presents a certain degree of elasticity, similar to that of a cyst filled with serosity. 3. If this manual exploration be continued in the same direction, the examiner will encounter both smaller and larger portions belonging to a single irregular mass, which can readily be moved or displaced like those of a body floating in water, and often, indeed, the different parts of the foetus may be recognized in these movable pieces.

1. The abdominal palpation, and the vaginal touch, are practiced simultaneously in most cases, and we shall therefore point out the signs furnished by this joint investigation at the different periods of pregnancy, since the whole diagnosis pending the first three or four months consists in the exact appreciation of the size of the uterus, and this can only be determined by the double exploration spoken of: The finger, having been introduced into the vagina, is applied directly on the neck, or, still better, against the anterior or posterior portion of the inferior uterine segment; while the other hand, placed above the pubis, presses down the muscular walls, and searches for the tumor formed by the fundus uteri; the womb is thus comprised between the vaginal finger and the hand on the hypogastrium, and of course, the volume of the organ may be thus ascertained, and a comparison be made between it and the unim-pregnated uterus. Moreover, its displacement in mass, can be very easily recognized in this position. To accomplish this, the finger should remain applied as above stated, and when the hand slightly depresses the fundus, the finger in the vagina recognizes the depression; and the counter-proof may be made by elevating the uterus from below, and pressing strongly on the inferior part, which is found deep in the excavation.

The signs obtained by percussion, which gives a dull sound over every part of the abdomen occupied by the developed uterus, instead of the resonance perceived at other points, may likewise be classified as appertaining to the abdominal exploration.

Some care is necessary in percussing, during the first four or five months, not to be misled by the dullness in the hypogastric region, which may be produced by the bladder distended with a large quantity of urine, or by any considerable pathological tumor. It should also be borne in mind that if several folds of the intestines become interposed between the ventral walls and those of the womb, this latter organ may be elevated almost as high as the umbilicus, and yet a clear sound will be given over nearly the whole sub-umbilical region.

Again, in the early months, the uterus is sometimes above the superior strait, an instance of which fact I had an opportunity of observing at the clinic, with Professor Dubois, in a woman who was advanced six weeks or two months, and whose uterus occupied so elevated a position (being placed in the right iliac fossa), that we

at first doubted the existence of pregnancy, which however did exist, for it was proved several weeks after in a more positive manner, as the event subsequently showed.

Hitherto we have only demonstrated that the uterus is developed, but the question arises what is the cause of that development? The solution of this question is nearly always exceedingly difficult; we may state, however, that when the womb is enlarged by a product of conception, it generally presents a greater flexibility in its walls than if the enlargement were dependent upon some chronic disease, and that, after a little practice, this suppleness can be detected by carrying the finger to the posterior surface of the body, which may be done in consequence of the depression and retroversion of the fundus. The uterine wall then offers about the same resistance as an oedematous limb, or perhaps still nearer, that of caoutchouc when slightly softened in hot water.

The tumor detected either by the vaginal touch, or by depressing the ventral parietes, is rounded and smooth throughout, and does not present any of those irregularities observed in cancerous or fibrous degenerations of its walls; and this fact, together with the preceding observation, will serve to distinguish a morbid state from a true gestation.

It certainly will not prove quite so easy to determine whether the enlargement is caused by the foetus, or the presence of a mole in its cavity; in fact, I do not believe this diagnosis is possible, except at a very advanced stage, and then the absence of the foetal inequalities, the non-appearance of its movements, auscultation, &c., might furnish just ground for doubt.

In some women, the womb becomes the seat of a congestion, and a considerable tumefaction, at the approach of the menstrual periods. Now this state may readily be confounded with a commencing pregnancy, the more particularly because at those epochs the neck usually becomes softer and dilates a little; and I know no way of escaping this error, if the woman insists on her pregnancy, and that she experiences the various rational signs of this condition. In two cases of the kind I have met with, I only succeeded in detecting the falsity of my diagnosis by examining the woman a second time, two or three weeks after; for these females, who were used as subjects for practicing the touch at the clinique, wished to be considered pregnant; but unhappily for them, the fortune which aided in the first examination, deserted them at the second; for, being ignorant of the cause of my mistake, they returned at a time still more distant from that of their menses.

On the whole, then, there is no certain sign of pregnancy during the first three or four months; but, however, it almost amounts to a certainty, when the sensible signs above indicated coincide with the presence of the rational ones, in a healthy woman who can have no intention of deceiving us as to her condition, though, in a medico-legal case, the physician should express his doubts, and demand a new examination at a more advanced period. But if it is not always

possible, at the beginning of a gestation to prove that it does exist, we can, at least in the great majority of cases, satisfy ourselves positively that it does not, for, most frequently, the unimpregnated state of the organ can be readily made out.

2. The existence of pregnancy is announced during the last five months by certain signs that are far more reliable than any of those hitherto mentioned, and which are revealed by the double exploration just described; these are the foetal movements, which have improperly been called the *active* and *passive*, but better designated by M. Stoltz as the movements *proper* and the *communicated* ones.

Active Movements.—The woman generally perceives the foetal motions at about four months and a half, although the muscles of the infant had contracted long ere this, unconsciously to her; for every accoucheur must have detected these motions by placing his hand upon the abdomen, at a time when the mother herself still doubted her own gestation. Now these movements are excessively feeble at first, producing, as all acknowledge, a kind of tickling, or rather a sensation analogous to that which a spider's claws excite in crawling; they gradually become more characteristic, and may then be classified in two species: the one being produced by the movements of the whole trunk, or some of its parts, the first of which are recognized by a quivering, that is perceptible to the female, while the partial motions produce some very large tuberosities, which are even visible through the abdominal walls; the other, on the contrary, are veritable shocks, certain small short strokes, which at times, are violent enough to elicit cries from the sufferer, and these shocks are evidently produced by the action of the thoracic or inferior extremities of the child. Such movements, so distinct and clear to the mother, would seem to be an infallible sign of gestation, and yet in some cases they do not prove so, since it is not at all uncommon to find women, whose veracity is beyond question, asserting that they have felt them for a long period, and sometimes even the motions have been perceived by the husband or other persons, but still they are not pregnant.

The history of one of the English queens is well known, who, believing she had felt the motions of a child, dispatched couriers with the happy news to all the foreign courts, but, unfortunately, it only proved to be the commencement of a dropsy! Such errors are frequent, and there are but few accoucheurs who have not met with numbers of them in practice. Consequently, the physician should not rely in this matter upon the statement of the woman, but should perceive them for himself before hazarding an opinion. It would seem, indeed, that in some cases, the intestinal movements, the rapid passage of gas in the intestines, certain partial and irregular contractions of the abdominal muscles, and the pulsation of a large artery, especially when situated behind any tumor which it raises at every beat, have often deceived not only the patient, but even her medical attendant.

Some females, from the desire of simulating pregnancy, have obtained the power of contracting their abdominal muscles in so bizarre

a manner, that many able accoucheurs have been deceived, and imagining that they felt the foetal movements, have consequently pronounced them pregnant. (*Montgomery*, p. 84.)

These motions may be detected by the vaginal touch in certain positions of the breech, or even of the trunk, but we must in these cases rely more particularly on the abdominal palpation. In general, it is only necessary to place the hand flat on the abdomen, or to make use of slight pressure, to perceive them; though if they are feeble and infrequent it is better to dip the hand in some very cold liquid, and then place it suddenly upon the skin. This rapid change in the temperature of the abdomen probably reacts upon the infant, for it generally moves convulsively.

Lastly, by performing a species of ballottement, *i. e.*, by placing a hand upon one side of the belly, and striking with the other at the same point on the opposite side, the foetus rarely fails to move actively.

As before stated, the movements commence about the end of the fourth month. To this law, however, there are numerous exceptions; thus, some women perceive them as early as the latter half of the third month, in others they are not felt before the fifth, sixth, seventh, or eighth months of gestation. One woman, who had advanced to the latter period, was brought to "la Clinique" in consequence of a fall in the street, and she assured us that she had never felt the movement prior to the accident. And we have already alluded to the person, seen by us at La Charité, under the care of Professor Fouquier, who was delivered at term of a very healthy child, but the motions of which were neither perceptible to the mother nor ourselves.

Mauriceau, Delamotte, and many others, bring forward similar cases. But the most remarkable of all is the one reported by Campbell: I knew a lady, he says, the mother of nine children, who, excepting in her first pregnancy, never perceived any motions of the foetus; but she was herself very inanimate and passive, and what was still more singular, the children were equally nonchalant as herself. Whenever an ascites complicates the pregnancy, these motions are very indistinct, thus affording an evidence that the abdominal walls, and not the uterus, detect the sensation.

After the movements have been distinctly felt, they sometimes diminish without any appreciable cause, both in frequency and intensity, and then altogether disappear, which circumstance demands the most serious attention of the accoucheur, as it is in general an unfortunate symptom.

I believe this spontaneous cessation of the active movements may usually be referred to a plethoric state of the mother, which reacts on the child's health. But whatever may be the value of this opinion, it is quite certain that bleeding, under such circumstances, has always produced a favorable result; for when not delayed too long, the movements reappeared soon after, and hence I cannot recommend this measure too highly.

The Passive Movements, or Ballottement.—This, agreeably to most authors, is an analogous sensation to that produced by placing a ball of marble in a bladder full of water, and then striking the bladder with the finger just under the spot where the ball rests, when the latter is thrown up, and falls back from its own weight upon the finger which displaced it. This comparison, however, only holds good at a certain period of gestation, and we shall again take occasion to refer more particularly to this point. To perform the ballottement, M. Velpeau directs the index finger of one hand to be placed under the cervix, and the palmar face of the other hand over the fundus uteri, then, by a sudden movement of the finger in the vagina, the uterus is to be pushed upwards; being movable, free, and the only solid body in the amniotic liquid, the foetus ascends, strikes the point diametrically opposite, and falls back upon the finger which gave it the propelling shock.

But as this mode will not, I believe, afford any satisfactory results in the majority of cases, I recommend students to pursue the following plan in performing the operation: the vaginal finger should *not* be placed under the cervix because it will then be separated from the foetus by the whole length of the neck, and of course the finger cannot recognize so clearly the descent of the displaced body; but rather in front of, or behind the neck (according to the woman's position), upon the walls of the *body itself*, for then the index is only removed from the substance to be examined by the very thin walls at the inferior region of the uterine body, and it detects very readily the least movements of the enclosed foetus. If the woman is standing, the index is entered in a vertical position, its palmar face is turned forward, and the other three fingers are flexed into the palm, and as the symphysis pubis scarcely exceeds an inch and a half in length, the digital extremity of the forefinger easily passes its superior part, and reaches the body of the organ, where it almost always encounters a hard globular tumor formed by the head of the foetus; then a smart blow is to be given by it, and the finger must remain immovable on the part struck. This shock should be made in a direction from below upwards and from behind forwards by suddenly flexing the first phalanx. This last recommendation I deem very important; for in the great majority of cases, the uterus is inclined forwards, its long diameter, like that of the foetus, corresponding very nearly to the axis of the superior strait. Now, if under these circumstances, the shock be communicated to the presenting part of the child from below upwards, and from before backwards, as generally done, it is evident that the motion given to it will, at furthest, be but a slight movement of displacement or jolting, but never one of ascension, which in fact would be impossible, because by the direction of the blow the foetus is pushed against the posterior uterine wall, and not along the axis of its cavity.

The ballottement may also be effected when the woman is recumbent, by acting in the manner I have just indicated, but it is then generally necessary to place the finger upon a point somewhat nearer

to the neck, sometimes in advance of the latter, but at others behind it. The erect position, however, is usually the more favorable for the perception of the ballottement, and therefore preferable.

It sometimes happens, about the fifth month of gestation, that if the woman be standing, the vaginal touch does not afford the sensation of ballottement; but if she be directed to lie down, and the vaginal finger be applied upon the uterine wall, whilst the fundus uteri is forcibly depressed by the other hand placed near the umbilicus, the vaginal finger is shocked by some part or other of the foetus, which is displaced by the external pressure. This sign usually begins to be of value about the fourth month; before that period the foetus, as a general thing, is too small in volume, and possibly the uterine walls are too thick. Again, it exhibits numerous varieties after that time; for instance, our search is not always successful in the fifth month, the small size of the child permitting it to change position very easily; on one day found without difficulty, the following it defies all efforts at detection.

Towards the seventh month, the ballottement is in general the most clearly recognized, since it is at this period especially that the finger perceives the solid ball, enclosed and swimming in a liquid, to bounce up and shortly afterwards to fall back upon it; but the sensation is no longer perceptible at the end of the eighth or the beginning of the ninth month, on account of the child's increased volume and the greater friction against the uterine walls, unless there happens to be a considerable quantity of the waters, and even then it is rather a displacement in mass than the true ballottement. Finally, in the latter periods of gestation, the head pushing the uterine wall before it, engages in the superior strait, sometimes even gets low down in the excavation, thus becoming jammed in, as it were, and of course the ballottement is then altogether impossible. Whenever this sensation is recognized, the authors declare it to be a certain sign of pregnancy; but this proposition is, perhaps, somewhat too general; for example, it is possible for a stone resting in the bas-fond of the bladder to lead to an error, and I once met with a case, which might readily cause a mistake of this kind. During the time I acted at the obstetrical clinic, as *chef de clinique*, a woman was subjected to the touch, who declared herself pregnant, and advanced three or four months; at first, I examined her in the recumbent position, and found all the negative signs of gestation, but one of my advanced pupils then performed the same manipulation in the standing posture, and declared that he perceived the ballottement, when I re-examined her, and found the following condition of things: the neck was strongly pushed backwards and a little to the left, it was slightly softened, and sufficiently patulous to admit the extremity of the finger. (This woman afterwards acknowledged she was delivered only four months previously.) As the finger left the cervix, and advanced just behind the symphysis pubis, it encountered a large resisting surface, which was evidently the body of the organ, and

then, by giving a slight shock, a movable body was felt there, which immediately fell back upon the finger, exactly like the foetus would in the fourth month. I confess that at first I believed her *enceinte*, and re-touching her in the recumbent state, I once more remarked the negative signs, but my finger could not now detect the substance that had been so easily moved when she was standing; at the third examination, I discovered a well-marked anteversion of the womb, so complete that its anterior face had become inferior or horizontal, and it was over nearly the whole extent of this face the finger had passed in examining; and further, I found that the fundus uteri, situated behind the symphysis pubis, was the light movable body which had produced the sensation of ballottement.

If a similar case should occur again, it might give rise to uncertainty in diagnosis, and on that account I concluded to make it public through this work.

There are also some particular positions of the foetus in which the ballottement would be of little service; for instance, in those of the breech it is generally very difficult, and nearly impossible in those of the trunk. In two cases, however, I succeeded in detecting a small part, which, from its diminished size, must have been an elbow, wrist, or heel; and this, together with the other signs, satisfied me that it was a position of the trunk: M. Hatin, who attended one of these women in her accouchement, found a presentation of the left shoulder; the other was delivered at the clinique, and like the first, verified my diagnosis.

3. *The Anal Examination.*—The accoucheur is very seldom obliged to introduce his finger into the rectum, but still a partial obliteration of the vagina may render such an exploration necessary, and where a tumor does exist at the posterior part of this canal, it is sometimes difficult to decide whether this enlargement is located in the recto-vaginal septum, or is dependent on the osseous parietes. Here the diagnosis is very important, for the course to be pursued in the two cases would be widely different, and all doubt may be removed at once by introducing the index into the rectum, and the thumb into the vagina.

I can recall but few other circumstances where an accoucheur would feel obliged to resort to the anal examination, although I am well aware that it is frequently recommended for certain cases of doubtful diagnosis in the earlier months; but most women are so shocked by this mode of examination, that, in truth, they are unwilling to submit to it, unless from motives of strong interest or necessity.

B. *Of Auscultation as applied to Pregnancy.*—M. Mayer, of Geneva, first detected the pulsations of the foetal heart by auscultation; but this discovery, originally published by him in 1818, had been entirely forgotten, when M. de Kergaradec announced, in 1823, that if the abdomen of a woman who has passed the first half of her pregnancy be carefully auscultated, two sounds, which are perfectly distinct in character, will be recognized: one of them, consisting

of double pulsations, or rather of redoubled ones, according to the expression of M. Stoltz, is evidently produced by the movements of the foetal heart, and it has been compared, with some reason, to the ticking of a watch enveloped in a napkin; the other is a kind of rustling, unattended by shocks, and consequently without beating, being constituted of some simple pulsations, accompanied by the soufflet, which have been successively compared to the sibilant murmur, or to the sound of an erectile tumor, or varicose aneurism: this is called the *bruit de soufflet*.

1. *Bruit du Cœur (Sound of the Heart)*.—The pulsations of the heart generally become perceptible in the course of the fourth or fifth month, more particularly during the latter, and often then at an elevated part of the abdomen near the umbilical region; in one case, however, I thought I heard them, a little before the fourth month, but unfortunately I could not re-examine that female until six weeks afterwards. These pulsations are far more frequent than those of the mother's heart, ranging from one hundred and thirty to one hundred and sixty per minute; and moreover, they are very often accelerated or diminished, without our being able to detect the cause of such modifications.

Like most observers I have several times remarked that, if the foetus exhibited any violent movements during the examination, the pulsations increased and became very difficult to count, but they are not influenced by any variations in the mother's pulse, whatever may be the cause of such variations.

The dorsal region of the child seems to transmit the double pulsations most easily, and consequently they are more clearly perceived at that part of the abdomen which corresponds to this region. This circumstance likewise explains why the pulsations change position so easily prior to the seventh month; in fact, it is only during the last three months, that any extensive movements on the part of the child become difficult, and thenceforth its position is nearly fixed.

They may be heard most frequently on the anterior inferior portion of the abdominal wall, just above the iliac fossa, or still more rarely on the median line, and not merely at a very limited spot, but over a radius of two or three inches. In some cases they may even be heard over more than half of the abdomen—but it is always easy to perceive that they are stronger and clearer at one point than elsewhere, and from this point as a centre, they become weaker and weaker as the distance increases. The intensity of pulsation is of course less marked as the child is younger, although, in some instances, they exhibit as much force in the sixth month as at term, but this is very unusual.

As regards the number of pulsations, the statement made by many observers, that it is much more considerable at an early period than at term, is not absolutely true, for the foetal heart always beats with the same quickness (saving some accidental variations) at whatever period it may be examined. Labour produces no modification of the foetal pulsations up to the moment of rupturing the membranes; but this rule fails after the amniotic liquid has escaped, because they

are then generally more loud and clear, and may be heard over a more considerable extent of surface, which can readily be explained by the fact that thinner parts then separate the ear or an instrument from the foetus.

When the contractions become more energetic, the pulsations are not so regular, and they are more feeble and slower while the contraction lasts.

In those cases where the accouchement is of moderate duration, the indistinctness of the bruit du cœur may be referred, I believe, to the difficulties of performing auscultation during the pain; but if the foetus has been too long subjected to uterine pressure—as where the labour has been unusually prolonged—the number, force, and regularity of the pulsations sensibly decrease.

Most observers have asserted that the sounds are not always perceptible, and M. Stoltz even declares that they cannot be heard whenever the dorsal region is directed backwards, unless some part of the thorax be in contact with a portion of the uterine walls which may be explored. As to myself, I have not failed, for several years past, to hear them in examinations made after the sixth month, in all cases of living children, and my researches have now extended to at least seven or eight hundred women, and I therefore feel convinced that we can always distinguish them after that period, whatever position the foetus may occupy.

The foetal bruit du cœur sometimes has a peculiar resonance, as M. Dubois described it, like a metallic tinkling, which fact I have twice had an opportunity of observing at the Clinique. This singular sonority is most frequently met with in women whose uteri are distended by a great quantity of the amniotic liquid. Besides these, there are yet some other circumstances which render the pulsations a little obscure and somewhat difficult to hear: thus, for instance, a lumbo-posterior position of the foetus, a large quantity of the waters (which greatly distend the uterine walls, and prevent a sufficient depression of them by the stethoscope to approach the child), the interposition of several folds of intestines between the abdominal and the uterine walls, and the existence of borborygmi, are all so many circumstances calculated to render the perception of those pulsations more difficult, although not absolutely impossible.

The beatings of the foetal heart are composed of two distinct *bruits*, the second being stronger and more sonorous than the first; but, in a great majority of cases, both of them may be heard quite distinctly.

M. Nægèle, however, appears to think that only a single sound is heard under certain circumstances, and I have sometimes made the same observation; but it has always seemed to me that the perception of only one *bruit* might either be referred to bad manipulation on my part, or else some one of those circumstances I have just described prevented the stethoscope from being applied over a point near enough to the back of the foetus. Thus, I have frequently heard but a single sound at first, but after changing the instrument, the other was clearly perceived; and I am happy to be enabled to ex-

tract the following paragraph from the thesis of M. Carrière, an élève of M. Stoltz, which fully confirms my opinion. He says: "I have remarked, in presentations of the cephalic extremity, that it was in remounting towards the fundus uteri the foetal pulsations particularly exhibited the simple character I have here described."

Like all useful discoveries, obstetrical auscultation has had its opponents as well as its partisans; and though the former are daily diminishing in number, the latter are certainly injuring the cause by exaggerating its importance; but, however, we shall carefully endeavor to ascertain its practical utility.

a. It has been stated that a perception of the pulsations in the foetal heart was a certain sign of pregnancy, as also that the absence of this sound, positively determined by several examinations made after intervals of some hours, subsequent to the sixth month, announces with certainty the death of the foetus; supposing, of course, we have a satisfactory assurance of the previous existence of gestation. There is, notwithstanding, one circumstance which might lead to a suspicion of pregnancy even when the uterus was really empty; it is this—in certain females the pulsation of the heart is felt and heard as low down as the sub-umbilical region, and we can imagine that if, in such persons, under the emotions naturally produced by an unjust suspicion of gestation, or if, from the influence of any febrile movement, the circulation be accelerated, the pulsations, from their number and rapidity, might be mistaken for those of the foetus; but in such cases, all errors of diagnosis may be easily avoided by observing: 1st. The perfect isochronism between the pulse at the wrist and the abdominal beatings; and 2d. That the intensity of pulsation constantly increases as the precordial region is approached; which two peculiarities are never presented by the foetal bruit du cœur.

b. Can a twin pregnancy always be recognized by auscultation? It is said that, in most cases, the existence of two children in the uterine cavity may be known by the following signs: 1st. The bruit du cœur will be heard at two distant parts of the abdomen; and 2d. The want of isochronism between these two series of pulsations may sometimes be detected.

These characters are advanced by some writers as indicating a double pregnancy with certainty, but we shall point out several sources of error on this point: thus, it frequently happens that the pulsations of a single heart resound in very distant parts. Now can this be referred, as M. Dubois thinks, to deficient thoracic development, to the unusual comparative size of the heart's cavities, to density of the lungs, or, lastly, to the position of the foetus itself, the head and extremities of which, being applied against the thorax, and there receiving the impulses from the heart's contractions, serve to transmit them to a greater distance? I should be inclined to adopt this view; for, whatever be the explanation, the fact is certain, and the following appears to me the best method of resolving the difficulty: Whenever the pulsations are heard at two distant points, the line between these should be carefully sounded with the instrument; for if they are produced by the presence of two

fœtuses, the pulsations will become feeble, or almost disappear, towards the centre of this line; but if, on the contrary, they are due to a single child, they will be just as strong at its middle part as at either extremity.

Again, the absence of isochronism in the pulsation does not positively prove the existence of two children; for one series may be owing to the foetal heart, and the other belong to the same organ in the mother, the resonance being transmitted to the abdominal cavity. Hence it is evident that the unusual perceptions of the mother's pulsations coinciding with the presence of a single fœtus may lead to the belief of a double pregnancy which does not exist, and a comparative examination of the pulse then becomes necessary. A double gestation may be easily recognized, if the precautions just indicated are observed, because, the twins being habitually placed one on the right the other at the left part of the abdomen, distinct beatings will be clearly heard, if the stethoscope be successively applied to each side. But this happy state of affairs does not always exist, for sometimes one fœtus is situated directly before the other; and then it is nearly impossible, even with the greatest attention, to hear the bruit du cœur of the posterior child; and consequently, when the other signs of a twin pregnancy are present, the results derived from auscultation would not be conclusive of its non-existence. Is it necessary to add, that equal care is requisite to abstain from hasty decisions in those cases, in which there is reason to believe that one of them is dead?

c. Auscultation has also been applied to the diagnosis of the foetal positions, but the results derivable from this method of exploration have certainly been exaggerated, though from the results of my own experience I may be permitted to lay down the following deductions: 1st. When the pulsations are heard low down, on the left, and in front, the fœtus is in the first position of the vertex (left occipito-iliac); if heard below, in front, and to the right, the fœtus is in the second position (right occipito-iliac), but it is often very difficult, not to say impossible, to distinguish an occipito-anterior from an occipito-posterior one, by this method. In general, however, I have thought the pulsations were more sonorous, and less apparent in the flanks, in the first case than the second. 2d. A presentation of the breech may be suspected, when the sounds are heard on a level with or above the umbilicus, the point where they are most distinct, indicating the relation of the child's posterior plane; and our suspicions will almost amount to a certainty when this sign shall be further strengthened by those derived from the "touch."

As to recognizing a position of the trunk, in the way described by M. Depaul, it seems to me to be wholly impossible.

d. Can we appreciate the state of the child's health or disease, of its debility or vigor, during labour, by means of auscultation?

This question, which was brought before the Academy by a memoir of M. Bodson, and which gave rise to a remarkable report by M. P. Dubois, is certainly one of the most curious and interest-

ing subjects of study ; for if we could possibly judge from the signs furnished by auscultation, of the integrity of the foetal life, no uncertainty could arise with regard to the course to be pursued when the labour is too much delayed, after the rupture of the membranes ; for the feebleness and relaxation, or the excessive frequency of the foetal pulsations, the intermission and irregularity of their rhythm, the absence of the second stroke, or the complete cessation of this phenomenon during the uterine contraction, and the slowness of its return after the pain has ceased, would sufficiently indicate a resort to a prompt termination ; whilst the opposite phenomena would authorize delay.

These signs, and more especially the irregularity of the pulsations, which appears the most important of all, indicate in the clearest manner, that the foetus is in a state of suffering ; and hence they should serve as a formal indication to the accoucheur to remove the infant promptly from the danger which threatens it, by an artificial termination of the labour. But, as M. Dubois has very judiciously remarked, there is not then a sufficient integrity of circulation to establish the extra-uterine life ; for, although the foetal pulsations may be still regular and sonorous at the moment of birth, yet the child has suffered so much from the long pressure of labour, that the respiration cannot be established ; and hence, in this respect, the accoucheur should not rely upon auscultation alone for judging of the opportune moment for the intervention of art, because other considerations quite as important should influence his decision ; but still this is a method of diagnosis that is never to be neglected.

e. M. Nægèle, junior, has recently described a bruit de soufflet, which he attributes to the pulsations of the umbilical cord, and compares it with the sound produced by the beating of the carotids in chlorosis ; and this bruit consists, he states, of a simple pulsation, which is not synchronous with the bruit de soufflet presently to be described. It is caused, as he thinks, by the winding of the cord around the neck of the foetus, or by its compression between the child's back and the uterine walls ; the bruit increases after the escape of the liquor amnii, and its force is greater in proportion as the arteries of the cord are the more developed, and are more twisted on each other.

In the positions of the head, it is situated below the umbilicus, but higher up in those of the breech, and it seems to descend during the expulsion of the foetus. Sometimes a bruit de soufflet is heard accompanying the cardiac pulsations, especially at the first sound, but it appears difficult to reconcile this circumstance with the interruption in the circulation caused by any pressure on the cord. Since M. Nægèle, junior, pointed out this peculiarity, several others have noticed it, and I also have met with it at different times, where nothing would indicate even a slight compression of the cord, or any winding around the neck.

Does this belong to the foetal heart, as M. Dubois and M. De-paul believe ? Indeed, the latter states that he has detected this

sound, which he had previously heard during the intra-uterine life, by ausculting the infant immediately after birth. But new observations can alone furnish an answer to this question.

Lastly, M. Stoltz has described a rustling sound, which is only observed after the death of the foetus, and is attributed by him to the decomposition of the amniotic liquid. "In searching for the signs furnished by auscultation, he says, I have noticed a dull, irregular murmuring like the sound of fermentation, in many women who were carrying dead children, which I did not confound either with the tinnitus heard when the ear is applied to any body whatever, nor with the rumbling or displacements of the intestines, and I therefore attributed it to a decomposition of the liquor amnii and the foetal fluids."

This phenomenon would not therefore be constant, because the decomposition does not always take place, especially at the commencement of gestation, for the silence of death generally reigns in the womb at that stage. Indeed, I have had several opportunities of ausculting females whose foetuses had ceased to exist for eight to twelve days, or even two weeks, but I have never heard anything resembling the bruit described by the learned Professor of Strasbourg.

2. *Bruit de Soufflet*.—This sound is synchronous with the maternal pulse, and consequently varies with it in frequency; it is free from pulsation or shock, and seems to involve the more sonorous parts. Numerous denominations, each of which is founded on its supposed nature, have been applied to this bruit: for instance, M. Kergaradec thought it was produced in the utero-placental circulation, and hence gave it the name of the *placental bruit*; on the other hand, M. Bouillaud, and many others, have subsequently assigned its seat (which, to say the least, is very probable) to the large arterial trunks placed on the posterior abdominal plane, where they are subjected to considerable pressure from the developed uterus, and they have denominated it on this account the *abdominal soufflet*; and still more recently, M. Paul Dubois has endeavored to prove that it originates in the vessels which ramify in the substance of the uterine wall itself, and he has called it the *uterine soufflet*. But as we shall take occasion hereafter to discuss these three opinions, which embrace all our present knowledge on the subject, we will pass them over here.

In general, the bruit de soufflet may be heard as soon as the uterus, by rising above the superior strait, becomes accessible to the stethoscope—that is, a little earlier than the sound of the foetal heart; in fact, M. Delens asserts he has detected it at the third month, and Dr. Kennedy towards the tenth, eleventh, or the twelfth week, but as there is a very great difficulty in approaching the uterus at so early a period, these facts are certainly exceptionable.

The bruit undergoes some very singular modifications during the course of pregnancy; thus, we do not hear it in every instance, and again it is not at all unusual for it to escape detection for a long time after having once been heard, then again it reappears somewhat

later ; sometimes even we may search a woman by auscultation for several minutes in vain, when it suddenly appears directly under the ear, augments, becomes quite loud and distinct, lasts for a few moments, then diminishes, and finally ceases altogether.

In other cases, two or three pulsations, attended by *blowing*, are heard during profound silence, but nothing more after that ; and on the other hand, very frequent opportunities are afforded us of observing the promptitude this bruit exhibits in changing its locality; for it seems to pass suddenly from one point to an opposite one, being sometimes immediately beneath the ear, at others very distant ; only covering a single spot in the majority of cases, but occasionally extending to two remote regions, and, what is very remarkable, with as much force and clearness at both those points ; further, the extent over which the sound is heard is usually quite limited, but in some instances it becomes perceptible over a very large surface, trespassing upon nearly the whole anterior abdominal region.

On several occasions my pupils have had opportunities of studying all these different varieties, which indeed are almost inexplicable, whatever opinion may be adopted as to the cause of the bruit.

The bruit de soufflet is modified during labour ; for at the very instant when the pains begin, and even before the patient herself is aware of the latter, it becomes at once louder, more sonorous, and more distinct, and at times exhibits some strange modifications ; thus, at one time the sound heard resembles, partially at least, the tone of a reed, or of a tense cord thrown into vibration, though as soon as the contraction becomes stronger and more general, the uterine bruit seems to grow weaker, appearing at longer intervals, and finally becoming imperceptible ; but when the pain ceases, the bruit returns (at first with the intensity it manifested at the beginning of the contraction), and gradually regains the same sonorousness it had during the gestation. Such is the order of succession when the contractions are regular and energetic; but if they are false or irregular, the bruit de soufflet is not modified, or at least is not any stronger, except it be for a few instants only.

It may likewise be perceived after the expulsion of the foetus, and even of the after-birth ; for example, M. Carrière says he has heard it twenty-four hours subsequent to the delivery of the placenta.

Generally, it extends towards the inferior lateral part of the abdomen ; more rarely, it is heard near the fundus uteri. The characters offered to the ear by this bruit are very different ; now and then, it is of short duration, abrupt, and followed by an interval of complete repose which separates it from the succeeding one and is variable in length, according to the rapidity of the pulse ; at other times it is a prolonged rumbling, a real *bruit de diable*, having its period of beginning and increase, the end being confounded with the one that follows. I believe it is wholly impossible, in the present state of our science, to explain these differences ; for although in the first edition of this work, I felt authorized to consider the intermittent bruit as having a different origin from the remittent soufflet, and I placed the seat of the former in the abdominal vessels,

and of the latter in the circulation throughout the uterine walls, yet subsequent experience has not confirmed my early researches, and I must frankly confess that I have frequently known the same bruit to be remittent and intermittent in turns, without anything occurring to explain this sudden change.

The seat and mode of production of this sound is a question that has given rise to much controversy, though, as the sound is synchronous with the mother's pulse, it must evidently be connected with the maternal vascular system. Thus far all agree, but diversities of opinion immediately spring up when a more precise location of it is attempted; for the bruit de soufflet is produced outside of the uterus, exclaims one party; not so, it is seated in the uterine or the placental vessels, say the others.

Every time a tumor is developed over the course of a large arterial trunk, the compression exercised by it on the vessel produces the bruit de soufflet, and it is not at all unusual to hear a bruit or a souffle in such cases, very nearly similar to that of pregnancy: now, the uterus developed by a product of conception constitutes a considerable tumor, one which must necessarily compress the vessels and produce the effect described. This view is advocated by numerous partisans, who contend that the bruit de soufflet does not begin to appear until the uterus really compresses the iliac vessels by being elevated above the superior strait; that it is usually heard at the inferior lateral part of the abdomen, and more frequently on the right side, because the uterus is habitually inclined to the right; and lastly, that if, according to the plan of my friend Dr. Jacquemier (which I have since often practiced myself), the female, after having been ausculted in the supine position, be made to kneel down, the body bent forward nearly horizontally, and the elbows resting on the ground, in a word, in such a position as to throw the whole weight of the uterus upon the anterior abdominal wall, the bruit de soufflet will no longer be heard, although distinctly audible before.

Those who locate the bruit de soufflet in the uterine circulation, differ essentially on two points: thus, M. de Kergaradec attributes it to the placental circulation; whilst M. Hohl, who also believes it is perceived at the point where the placenta is inserted, differs from him, by supposing that this sound results from the passage of the arterial blood into the venous sinuses of the placenta; but, to refute this latter opinion, it is only necessary to bear in mind the great variety in the seat of this bruit during pregnancy, and that it is still perceptible after the delivery of the after-birth.

The views of M. Dubois still claim a notice; for whenever, says this Professor, the disposition of the uterine apparatus is carefully studied, some free communications will be found to exist between the arteries and veins, the uterine walls appearing to be transformed into an erectile tissue, or into a series of varicose aneurisms; and the column of blood brought by the arteries and divided through their branches, mingles, whilst passing directly into the veins, with the slower and less compressed columns contained in the canals of the latter; which circumstance is incontestably the cause of the

tinnitus and the bruit de soufflet that is so remarkable in varicose aneurisms and the accidental erectile tissues, and it is very likely that the same cause produces it in the uterine walls. Hence we can comprehend why it is only heard at that period when the vascular modifications of the organ are the most marked ; why it is most frequently audible over the spot corresponding to the placental insertion, because the development of the uterine vascular system is the most considerable there ; and finally, why this bruit may still be heard in some women after the delivery, when the retreat of the uterus is not yet complete, and the circulation in its walls has not been reduced to the condition of the non-gravid state.

There are still some other points concerning the uterine circulation, which have recently been advanced : thus, Dr. Corrigan thought the passage of the blood from the uterine arteries into the sinuses, was the cause of the bruit de soufflet ; and M. Carrière, who admitted this opinion, added, that the circulation being much more active at the point corresponding to the placental insertion, the bruit should be most audible on a level with that insertion.

M. Depaul has quite recently re-promulgated the views of Corrigan, adding thereto the compressions produced both within and without by some portion of the foetal ovoid, and he attributes an important influence to these compressions, which, however, had previously been brought forward by M. de Kergaradec, in explanation of the frequent variations of the bruit de soufflet in its seat and intensity. Now, from such conflicting statements, what opinions are we to adopt as conclusive ? True, in the great number of cases, the compression of the extra-uterine vessels doubtless affords a satisfactory account of this sound, as the reasons before given seem to us unanswerable. But is this compression the sole cause ? I think not; for in my opinion, such a pressure may sometimes be made on a great vessel without producing the bruit de soufflet ; indeed, it has frequently occurred to me, after placing the stethoscope on the umbilical region and strongly depressing the uterine wall, both to hear and perceive distinctly the aortic pulsations ; and, notwithstanding the violent pressure sustained by this vessel under such circumstances, I could not distinguish at that point any bruit whatever, whilst it was distinctly heard in the same woman upon one side of the abdomen.

We must, therefore, search elsewhere for its true seat ; and, while rejecting the theory of M. Dubois (for the anatomical fact upon which it is founded does not exist), I must still believe that, under certain circumstances, this sound may be produced in the uterine walls.

"The cause of the bruit, says M. de la Harpe de Lausanne, neither rests on a particular condition of the blood, nor on a modification of its course, nor yet in any peculiar state of the vessels, but simply on the multiplicity of the vessels concentrating at the same point ; which augmentation, by increasing the currents an hundred fold, increases the sounds in the same ratio ; thus rendering those audible by multiplication, which taken singly were imperceptible to the

human ear. Perhaps a comparison will serve to illustrate my idea : if a person place himself, on a mild day, under a tree that has been closely pruned, been deprived of its leaves, and only having some large branches left, he will hear no sound or rustling of the air; now let him pass from this tree to another one better furnished with branches, though still deprived of leaves, and he will perceive, if the same air be stirring, a commencing sound, produced by the branches that are agitated in the wind; again, the intensity of sound will become much greater, if he once more changes to a fir-tree; for notwithstanding the leaves of this latter are rigid and immovable, yet they are innumerable; and just such is the placental bruit. In fact, a liquid cannot circulate in a tube without producing a certain amount of sound by the friction of its molecules against the walls of the tube; only the sound is not detected by the ear when the vascular canal is isolated, but the contrary results, when thousands of little canals are found at the same point."

I therefore admit, as will be seen, that the bruit de soufflet may depend upon two entirely different causes ; namely, the compression exercised by the uterus on the abdominal vessels, and the minute and infinite circulation in the uterine walls; but I cannot now assert, as in the first edition of this work, that these two sounds may be easily distinguished from each other, because a more extended observation has often demonstrated the little value of those signs, which I then thought sufficient to establish the diagnosis.

It is, however, worthy of notice, that the extra-uterine sound is ordinarily accompanied by a pulsation, a shock dependent on the arterial diastole, which is absent in the bruit produced in the substance of the uterine walls. But it is often a very difficult matter to make out this distinction; however, this is less to be regretted as the bruit de soufflet has no great practical importance, for though its existence renders pregnancy probable, yet the sign may be present without and not always with a gestation; again, it is altogether foreign to the life or death of the foetus, and merely serves, in some cases, to point out the placental insertion, for the uterine vessels being more numerous and better developed in the vicinity of this attachment, the bruit de soufflet will evidently be better heard over this point than elsewhere.

Summary.—It is now well understood that, in auscultating the abdomen of a pregnant woman, we may hear both the pulsations of the foetal heart and the bruit de soufflet. The first is a certain sign of pregnancy; but the second, being also produced by other causes, only becomes of importance when we have previously ascertained that the female has no other disease.

The sound of the heart may aid in ascertaining the position of the foetus; the bruit de soufflet only points out the supposed place of the placental insertion, but indicates nothing as regards the child's position; while any feebleness, and more especially any irregularity or intermittence of the heart's pulsations, furnish strong presumptive

reasons for believing the foetus is suffering, and its life is compromised.

When desirable to auscult a female who is supposed to be pregnant, we must request her to lie down on her back; at the commencement of gestation this precaution is indispensable, but towards the last it becomes less so, and she may then be examined standing. In fact, whatever be her position in the latter months, this exploration is quite easy, on account of the volume of the foetus, but at first it is nearly always necessary to flex the thighs upon the belly, so as to completely relax the abdominal muscles, and of course this could only be done in the horizontal position. The dorsal or lateral decubitus is requisite to explore thoroughly the fundus or sides of the womb, or to cause the foetus to fall off from either side, the thighs sometimes being flexed, at others extended, according to the region examined.

The unaided ear will answer, but the stethoscope should generally be employed; for, by using it, the sounds detected can be more readily limited to one spot, and the abdominal parietes more easily depressed so as to approach nearer to the foetus; besides, many females object to the accoucheur's thus applying his head flat on the abdomen. Experience has likewise convinced me that, when the unassisted ear is used, the clearness of the sensations is singularly diminished by the frictions which the respiratory movements of the abdomen make against the ear. When used, the enlarged extremity of the instrument should be deprived of its mouth-piece, and its whole circumference be exactly placed over the region to be ausculated.

It is also advisable that the woman lie on a bed of a sufficient height, otherwise the accoucheur is obliged to stoop too much, and this inconvenient position is attended by such a degree of congestion as to render it impossible to hear anything. And further, to avoid all unnecessary searching, it is best to place the stethoscope at first directly over the part where the pulsations of the heart are most commonly heard, that is, in front, below, and a little to the left side.

It is equally desirable to ascertain from the female where she generally perceives the foetal movements, for most frequently the pulsations of the heart will be found on the opposite side, because the superior and inferior extremities being always folded on the abdominal plane, the back (in other words, the part of the foetus which most easily transmits the sounds) will evidently be turned towards the left, if the right side is the habitual seat of the active motions. And we take occasion to remark, in conclusion, that the instrument, the extremity of which is intended to be introduced into the vagina, and there applied to the neck or inferior part of the womb, recently proposed by Nauche for this purpose, under the name of métroscope, ought to be rejected.

A Table exhibiting the Signs of Pregnancy at the different Periods.

RATIONAL SIGNS.

SENSIBLE SIGNS.

First and second months.

- | | |
|---|--|
| 1. Suppression of the menses (numerous exceptions). | 1. Augmentation in the size and weight of the uterus. |
| 2. Nausea—vomitings. | 2. Descent of the organ. |
| 3. Slight flatness of the hypogastric region. | 3. The womb is less movable. |
| 4. Depression of the umbilical ring. | 4. Its walls have the consistence of caoutchouc. |
| 5. Tumefaction and tenderness of the breasts. | 5. The neck is directed downward forward, and to the left. |
| | 6. The orifice of the os tineæ is rounded in primiparæ, but more patulous in others who have had children. |
| | 7. A slight softening in the mucous membrane covering the lips, and this membrane appears oedematous. |

Third and fourth months.

- | | |
|---|--|
| 1. Suppression of the menses (a few exceptions). | 1. The fundus uteri rises to the level of the superior strait towards the end of the third month, and is perceived at the close of the fourth about the middle of the space between the umbilicus and pubis. |
| 2. Frequently, the apparition or the continuance of the vomitings. | 2. A perceptible flatness on percussion in the hypogastric region. |
| 3. A small protuberance in the hypogastric region. | 3. A rounded tumor, as large as a child's head of a year old, may be detected there by the abdominal palpation. |
| 4. Less depression of the umbilical cicatrix. | 4. By resorting to this process and the vaginal touch jointly, the displacement en masse, and the volume of the uterus may be easily ascertained. |
| 5. Augmented swelling of the breasts, prominence of the nipple, and slight discoloration in the areola. | 5. The neck has the same situation and direction during the third month as in the preceding ones; at the fourth it is elevated and directed backwards and to the left side. |
| 6. Kiesteine in the urine. | 6. The ramollissement of the periphery of the orifice is much better marked. The latter is more open in <i>multiparae</i> , even admitting the extremity of the finger; but it is closed and always rounded in <i>primiparae</i> . |

Fifth and sixth months.

- | | |
|--|---|
| 1. Suppression of the menses (some rare exceptions). | 1. The fundus uteri is one finger's breadth below the umbilicus at the end of the fifth month; and the same distance above it at the expiration of the sixth. |
| 2. The disturbances in the digestive organs generally disappear. | 2. Foetal irregularities, and active movements, which are very perceptible. |
| 3. Considerable development of the whole sub-umbilical region. | 3. The bruit du cœur, and bruit de soufflet are now perceptible. |

Fifth and sixth months.

RATIONAL SIGNS.

4. A convex, fluctuating, rounded abdominal tumor, salient, particularly on the middle line, and sometimes exhibiting the foetal irregularities.
5. The umbilical depression is almost completely effaced.
6. The discoloration in the areola is deeper—glandiform tubercles; areola spotted.
7. Kiesteine in the urine.

SENSIBLE SIGNS.

4. Ballottement.
5. A tumor is felt at the anterior-superior part of the vagina, which is sometimes soft and fluctuating, at others rounded, hard, and resisting.
6. The inferior half of the cervix uteri is softened.
7. The whole unguial part of the first phalangeal bone can penetrate the cavity of the neck in *multiparæ*. The latter is softened to the same extent in *primiparæ*, but the orifice is closed.

Seventh and eighth months.

1. Suppression of the menses (the exceptions are very rare).
2. Disorders of the stomach (very rare).

3. The abdominal tumor has the same characters, except that it is more voluminous.
4. A complete effacement of the umbilical depression, the dilation of the ring, and sometimes a pouting of the navel.
5. Numerous discolorations on the skin of the abdomen.
6. Sometimes a varicose and œdematous condition of the vulva and inferior extremities.
7. Vaginal granulations — abundant leucorrhœal discharge.

8. Deeper discoloration of the central areola, and an extension of the spotted areola. Sometimes there are numerous stains on the breasts; flow of milk; complete development of the glandiform tubercles.
9. Persistence of kiesteine in the urine.

1. Increased size of the abdomen.
2. The fundus uteri is three fingers' breadth above the umbilicus at the seventh month, and four or five at the eighth.
3. The organ is nearly always inclined to the right.
4. More violent active movements of the foetus.
5. Bruits du cœur and de soufflet.
6. Ballottement is very clear during the seventh month, but more obscure in the eighth.
7. The ramollissement extends along the neck, above the vaginal insertion. In *primipare*, the cervix is ovoid, and seems to have diminished in length; in others it is conoidal, the base being below, and sufficiently patulous to admit all the first phalanx. The neck at its superior fourth is still hard and shut up.

First fortnight of the ninth month.

1. The vomitings frequently reappear.
1. The fundus uteri reaches the epigastric region, and gains the border of the false ribs on the right side.

First fortnight of the ninth month.

RATIONAL SIGNS.

2. The abdominal tumor has increased —the skin is much stretched, and very tense.
3. Difficulty of respiration.
4. All the other symptoms persist, and are increased in intensity.

SENSIBLE SIGNS.

2. Active movements. *Bruits du cœur et de soufflet.*
3. Often there is no proper ballottement, but merely a kind of rising of the tumor formed by the head.
4. The neck is softened throughout its whole length, excepting the circumference of the internal orifice, which still remains closed and resisting. In women who have previously borne children, the finger may be introduced into the cervix to the extent of a phalanx and a half, and in fact is only arrested by the internal orifice, which is closed and wrinkled, though, in some cases, already beginning to open. In *primiparæ*, the ramollissement is equally extensive, and the neck is swollen in the middle in an ovoidal form, but the external orifice, although partially opened, does not permit the introduction of a finger.

Last fortnight of the ninth month.

1. The vomitings often cease.
2. The abdomen is fallen.
3. The respiration less oppressed.
4. More difficulty in walking.
5. Frequent and ineffectual desires to urinate.
6. Hemorrhoids; augmentation of the œdema and varicose state of the lower extremities.
7. Pains in the loins, and colics.

1. The fundus uteri has sunk lower than in the first fortnight.
2. Active movements; *bruits du cœur et de soufflet.*
3. Ballottement often imperceptible.
4. The head more or less engaged in the excavation.
5. In *multiparæ*, the internal orifice softens and dilates; the finger can then penetrate through a cylinder (as it were) an inch and a half in length, and come into contact with the naked membranes. In *primiparæ* the internal orifice experiences the same modification, but the external remains closed. During the last week, in consequence of the spreading out at the internal orifice, the whole cavity of the neck becomes confounded with that of the body, and the finger, in reaching the membranes, only traverses a thin orifice in *primiparæ*, but a rounded collar in the others of a variable thickness.

CHAPTER II.

OF TWIN PREGNANCY.

THE term compound or multiple pregnancy has been applied to that in which two or more foetuses are enclosed in the uterine cavity. Certain females seem to be greatly disposed to these anomalies; thus, cases are recorded where six, seven, and even eleven children have been born at three successive accouchements; indeed, double pregnancies are quite frequent; that is, one case is met with in about seventy or eighty labours. Triplets on the contrary, are very rare, since there were but five in the records of 37,441 accouchements that occurred at la Maternité in Paris. Further, we cannot call in question those instances in which there were said to be four at a birth; for such men as Viardel, Mauriceau, Hamilton, and many others furnish examples of it.* But, very few can declare, as Lauverjat has done, that they have seen cases of five at one birth.†

* The following statistical account is extracted from Churchill's work. In 161,042 pregnancies, there were 2477 cases of twins, or 1 in 69, and 36 triple do., or 1 in 4473 (English accoucheurs).

In 36,570 pregnancies, there were 582 cases of twins, or 1 in 110, and 6 triples, or 1 in 6095 (French accoucheurs).

In 251,386 pregnancies, there were 2967 cases of twins, or 1 in 84, and 35 triples, or 1 in 7185 (German accoucheurs).

Total, in 448,998 cases, there were 5776 instances of twins, being 1 in 77 $\frac{1}{2}$, and 77 triplets, or 1 in 5831.

The same author furnishes the accompanying information as to the sex of the twins: Dr. Joseph Clarke states, that in 184 twin cases, both children were boys 47 times, girls 68 times, and one boy and one girl 71 times.

Dr. Collins reports 240 cases, in which there were two males 73 times, two females 67 times, and male and female 97 times; and Dr. Lever 33 cases, two males 11, two females 11, and male and female 11.

† M. Pigné informed me that he saw a single placenta at Strasbourg, from which five separate cords arose, although only a single sac existed, which was composed of three caducous membranes, chorion and amnios, in which the five embryos were enclosed.

Dr. Kennedy (*London Med. Gazette*) presented to the Royal Society the history of a woman who aborted at three months of five embryos. There were three ova, one being double, and each ovum had a placenta and its own proper membranes.

M. Bourdois (*Gaz. Méd.*, p. 569, 1840) describes a quadruple pregnancy, in which the delivery occurred at the seventh month. The second child was born twelve hours after the first, and the other two a few minutes subsequently. The second accouchement was attended by a new discharge of waters; there were two placentas, one of which had three cords and was adherent, and some portions of it remained behind in the uterus.

Dr. Hull, of Manchester, deposited five little twin foetuses in the museum of the London College of Surgeons, that he had obtained from a woman who aborted at the fifth month of gestation.

And lastly, must we consider those cases of six, seven, eight, and nine children, or even more, at once, so many examples of which are found in the authors, as true statements or as fabulous tales?

It is a very difficult matter to point out the causes of this anomaly in the present state of our science; true, numerous explanations have been offered, but all are nothing more than pure hypotheses; for example, it is said that a single fecundation may affect both ovaries, or two of the Graafian vesicles in the same ovary; and again, that several impregnations may occur successively in a short period, that is, before the first fecundated ovule has arrived in the uterus. Both take it for granted that two ovules are detached either at the same time or successively, from the ovary, and consequently that two corpora lutea are developed; but several well-attested facts prove, however, that a different state of things may take place; thus, for instance, two eggs have sometimes been found in the same Graafian vesicle, and it is evident that the rupture of this vesicle alone, in such a case, might produce a double fecundation; at other times, two yolks have been seen in the same ovule; and in such a condition a twin pregnancy might certainly occur, although but one ovule be fecundated.

Hereafter we shall see, that these peculiarities serve to explain the varied disposition exhibited by the membranes in compound gestations.

It is frequently possible to recognize the presence of twins during pregnancy; indeed, the abdomen is ordinarily more voluminous than than at other times, and the belly is generally flattened on the median line, instead of presenting there a well-marked protuberance; the middle is depressed in consequence of the two children lying one upon each side; nevertheless, this sign may fail when one child happens to be placed as we have described before the other. As a further sign, we may mention that the little shocks perceptible to the mother are sometimes felt at one and the same time in two distant parts of the abdomen; and the importance of auscultation as an element in this diagnosis has already been pointed out (*vide p. 127*), to which we refer. Again, as the two foetuses mutually interfere with each other, neither of them presents itself to the vaginal touch, and of course the ballottement is then exceedingly difficult, if not wholly impossible; for, even if the finger should easily reach the presenting part, the presence of another child would interfere with the ascending movement of the first. Desormeaux, however, cites a case where the ballottement was manifest in a twin gestation, but even here a large quantity of water was present at the same time.

Chambon records an instance of quintuple pregnancy, where the children survived their baptism.

A woman of Naples was delivered of five infants at seven months. (*British and Foreign Med. Review*, 1839.)

Dr. Kennedy (Every) states (in the *Dublin Med. Journal*, Jan. 1840), that a woman aborted of five embryos between the second and third months of gestation; and finally, Dr. Francis Ramsbotham has collected three cases of quintuple pregnancy from the public journals.

It not unfrequently happens that twin pregnancies terminate before full term, owing, doubtless, to the great distension of the organ.

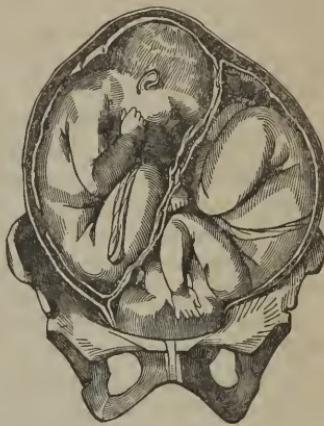
Again, the membranes are not always disposed in the same manner in these pregnancies; and on this head we may admit, with M. Guillemot, who has particularly studied the subject, four distinct varieties: thus, in the first, two ovules are fecundated, and each embryo becomes developed, and is surrounded by its own proper membranes; in the second, the ovule contains two germs; though each foetus has but a single envelop, the chorion being a common membrane; in the third, both embryos are enclosed in a single cavity, which appears never to have been divided by any membranous diaphragm; and finally, the last variety is met with, when the ovule contains a second germ, and both become developed together, which gives rise to what are called monstrosities by inclusion. Adopting this classification as the basis, let us now proceed to the different modes of termination presented by these pregnancies, according to the species to which they belong.

1. In the first variety, both ovules are developed, retaining their proper membranes, the chorion and amnios; sometimes each embryo even has at first a special caducous membrane, but generally that portion of the latter which forms the partition is very thin, and becomes absorbed as the gestation advances, and a single caducum then appears to envelop both.

The two chorions then repose against each other, being only separated by some very fine areolar tissue, in such a manner as to produce as many partitions as there are children; and hence each of these divisions is composed of four laminæ, the two chorions and the two amnios. The placentas are usually confounded with each other, or else are united by a kind of membranous bridge; but notwithstanding this continuity of tissue, there rarely exists any vascular communication between them, and this fact is so uniform that the exceptions to the law are very rare indeed. From all which it must therefore be evident that two distinct ovules have been fecundated, whether they are lodged separately, or are connected in the same vesicle.

In the accouchement, the same labour frequently suffices for the expulsion of both, but this is not constant; for, after the first child is born, the uterus may retract, may apply itself to the remaining twin, and leave it unexpelled for eighteen or twenty hours, or indeed for two or three days, or even a longer time may intervene between

Fig. 25.



The twins seen *in situ*, surrounded by their membranes; a partition divides the uterine cavity into two distinct compartments, each of which lodges a child.

the two parturitions ; and it is upon such facts as these, that some persons have improperly admitted the doctrine of superfœtation, as it is called. A reference to it, however, is unnecessary to explain these observations, for the cause of premature delivery is dependent solely on the enormous distension of the uterus, because as soon as one infant is expelled the womb retreats, the cause of irritation no longer exists, and we can readily conceive that the gestation may continue on until term.

The child thus born at seven months may live equally well with the one delivered at the end of pregnancy, and it would be curious indeed to see a legal decision according in a case of this kind the rights of primogeniture to the last born. In double pregnancies, the twins do not always attain the full development we have just indicated ; thus, one foetus may die while the other continues to grow ; and in these rare cases, the dead body may either remain in the womb where it hardens, withers away, and is expelled at the time of the accouchement ; or its presence, by irritating the uterus, may bring on the contractions which expel it from its cavity, while the development of the other constantly progresses.

Lastly, the twin that died during the gestation, may still remain in the womb, in consequence of the adherences which its placenta has contracted with that organ, for a long period after the expulsion of its living brother, that occurs at the ordinary term of gestation.

Guillemot furnishes one of the most curious observations of this kind (*Heureux Acc.*, livre ii. p. 225) on record, in which the artificial extraction of the dead body did not take place until two years after the accouchement. But what is the cause which thus determines the death of one foetus ?

Mauriceau and Peu thought this might be attributed to the fact that one child, by receiving all the nourishment, becomes strong and vigorous and defrauds the other, thereby rendering it feeble and languishing, and causing its early death.

M. Guillemot believes that one child, in its growth, squeezes and presses the second gradually against the uterine wall, and the latter not having sufficient space for its development soon after dies. Lastly, M. Cruveilhier explains the atrophy of the foetus by the successive separating of the placenta, founding his opinion on a single case in which the hemorrhage was abundant enough to account for the early death of one of the twins ; but in the greater number of cases that have been recorded, no mention whatever is made of any hemorrhage during the pregnancy ; whence, of course, the opinion of M. Cruveilhier would not be applicable to them. For my own part, I believe these cases, in which the death and atrophy of one foetus takes place, should rather be attributed to some disease of the infant or placenta, or some other part of its envelops. It may be urged, indeed, that these alterations are not observed at the time of the accouchement, but that is not to be wondered at, considering the state of degeneration which all the parts of the ovum are then in ; and, notwithstanding no positive fact sustains this

opinion, yet it seems to me more admissible, and more rational than the others.

The peculiarities just studied in twin pregnancies, may also present themselves in cases of triplets, &c. Thus, in a case cited by Portal, after the delivery of the first child and its placenta, which were healthy, he was obliged to extract two others that had apparently been dead for a long time, and were completely decayed.

2. In the second variety of complicated pregnancy, the chorion is common to both twins, and each foetus has but a single envelop formed of the amnios—the two laminae of which, resting against each other, constitute the median partition. MM. Dance and Mancel have furnished an example of this variety in which there were but two children. Brendelius reports that a woman was delivered of two girls after three days travail, but she died before the extraction of the third infant, which was found dead on opening her body; the placenta was single and very large, and the chorion had been common to all three, although each foetus had a distinct amnios.

There is therefore only a single placenta, and a communication nearly always exists between the ramuscles of the two cords, as I have verified, myself, on a placenta which was presented by one of my former pupils, an Interne of the Ursuline Hospital, where he obtained it. In this, as in the preceding variety, one foetus may die, the other continuing to live; but it is easily foreseen that an expulsion of the two children cannot take place separately.

3. Further, it may happen that the foetuses are not separated by any partition, and are all shut up in the same amniotic cavity; and to the examples of this kind, already cited, I may add a case observed by my friend and colleague, Dr. Fournier. The two cords arise, most frequently at least, from a distinct point of the placenta; but sometimes they are observed to come from a common trunk, which bifurcates at a variable distance from the placental surface. In this variety, the expulsion of one foetus must evidently be followed by that of the other; but I do not know to what extent we can justly say that the death of one necessarily endangers the other's life, if not speedily delivered by nature. (Baudelocque.) This inclusion of two foetuses in the same amniotic cavity, is often met with in those cases where one of them is deprived of an important part of its body; thus, the monstrosity that I presented to the Royal Academy of Medicine was enclosed in the same sac with its twin brother.

But it is nearly or wholly impossible, in the present state of *ovological* knowledge, to explain this strange anomaly, the existence of which, however, has several times been clearly verified.

Anticipating what we shall have to say hereafter, concerning the formation of the amnios (*vide Art. Ovology*), we may assert that this membrane emanates from the embryo itself, and consequently that the amniotic membranes should equal the foetuses in number; but, without admitting the theory of Pockels and Serres on the development of the amnios, a theory which, notwithstanding its want of probability, derives from the facts alluded to a certain degree of support, we cannot explain them but by supposing that two

amnios existed primitively, and the partition produced by their resting against each other has been somehow destroyed. Most generally, there are numerous communications existing between the umbilical ramifications, as we have stated, when the chorions, and especially the amnios, are found in common; but this fact is not constant. Thus, Dodd reports a case of triplets, where the placentas were consolidated into one, two of the children being enclosed in a common chorion, whilst the third had a special one, though the umbilical vessels did not communicate together. In another instance, recorded by Davis, the three foetuses had a mutual caducum; two of them were surrounded by the same chorion and amnios, but the third had its chorion and amnios distinct from the others; the placenta formed a single mass, but the vessels had no communication with each other. (*London Med. Gazette*, 1841.)

4. Finally, the fourth variety of compound pregnancy that we have admitted, along with M. Guillemot, constitutes what has been called a monstrosity by inclusion. It consists of the complete inclusion of the elements (whether more or less numerous) of one foetus in the body of another foetus, which is otherwise well formed.

M. Ollivier d'Angers, who has published a very interesting article on this monstrosity, admits that the inclusion may take place in two different ways; for instance, the contained foetus is sometimes shut up in the abdominal cavity of the other child, thereby constituting the *profound*, or *abdominal inclusion*. At others, it is merely enveloped by the teguments of the latter, which form an exterior tumor, without any communication whatever with the visceral cavities of the foetus that carries it; this is the *cutaneous*, or *exterior inclusion*. This latter has again been subdivided into two varieties, according as the tumor occupies the scrotum or the perineum; but as the character of this work evidently prohibits me from entering into a discussion of the various opinions put forth as to the nature and the mode of formation of this kind of monstrosity, I can only allude to them here; and I refer for more complete details to the memoir of M. Ollivier (*Archives*, 1827), as well as to that of M. Lesauvage de Caen, and still more especially to the admirable *Traité de Teratologie*, by M. Isodore Geoffroy St. Hilaire.

CHAPTER III.

OF EXTRA UTERINE PREGNANCY.

THE fecundation, as elsewhere stated, most frequently takes place in the ovary, and the impregnated ovule is then received by the fimbriated extremity of the tube, which applies itself on this organ, doubtless by a kind of spasmoid contraction; having been once deposited in the tubal canal, the ovule traverses its whole length, and

falls into the uterine cavity, where its development continues to progress until term. Such is the course observed in *normal*, or *uterine pregnancy*; but it may happen that the ovule is arrested, or diverted, in the route it thus travels, and engrafting itself (so to speak) upon the point of arrest, is there developed; in the latter case, the pregnancy is called an *abnormal*, or an *extra-uterine* one.

This species of gestation has been subdivided into several varieties, which have received different names, according to the part of the passage where the ovule becomes fixed. Thus, we may admit with M. Dezeimeris the following divisions, namely:—

- The ovarian pregnancy.
- The sub-peritoneo-pelvic pregnancy.
- The tubo-ovarian pregnancy.
- The tubo-abdominal pregnancy.
- The tubal pregnancy.
- The tubo-uterine interstitial pregnancy.
- The utero-interstitial pregnancy.
- The utero-tubal pregnancy.
- The utero-tubo-abdominal pregnancy.
- And the abdominal pregnancy.

1. The *ovarian pregnancy* is that variety in which the ovum is developed in the ovary itself; or rather, the fecundated ovule is found on the interior of the envelop or ovarian vesicle that contained it prior to fecundation; or else, after having ruptured this vesicle, it remains adherent to the surface of the ovary, thus constituting two varieties, the first of which has been denominated the *internal ovarian pregnancy*. Among the recorded observations of our science, bearing on this point (which, however, do not appear very satisfactory to M. Velpeau), is one reported by Boehmer, about which it would be out of the question to raise a serious doubt; for the author carefully describes both the proper membrane of the ovary and its peritoneal envelop; and, unless we contest the accuracy of his details, it is impossible to deny that the foetus was really in the substance of the ovary itself.

But M. Velpeau, who rejects this variety of extra-uterine pregnancy, says, that a conception cannot occur without the direct contact of the fecundating liquid with the ovule; and as this junction evidently requires the previous rupture of the ovarian vesicle, an internal ovarian pregnancy, properly so called (that is, where the ovule is developed within the interior of the vesicle), is wholly impossible. We acknowledge the speciousness of the argument, but shall reply, like M. Dezeimeris, that, in the present state of our science, the manner by which the sperm exercises its influence over the ovule cannot be positively determined; and that, between a simple theoretical view, however ingenious it may be, and a well-observed fact, the most cautious cannot long remain undecided.

The second variety is designated under the term of the *external ovarian*, though it might also be called the *ovo-abdominal*, because the ovule is partly developed in the abdomen, partly in the substance of the ovary itself.

In the first variety of ovarian pregnancy, the product of conception is evidently exterior to the peritoneal cavity.

2. *Sub-peritoneo-pelvic Pregnancy*.—Under this appellation, M. Dezeimeris designates a species of extra-uterine pregnancy, in which the ovule, after having quitted the ovarian vesicle, and being unable to penetrate into the external opening of the Fallopian tube, gets between the two laminae of the broad ligament, and is there developed. Of course, the ovule is situated without the peritoneum, and it lodges principally in the pelvic cavity.

According to this author this species is not very rare, and from the situation of the ovule it is one of the least consequence; indeed, its situation signally favors the spontaneous expulsion of the foetal debris, or at least renders them more accessible, in case their extraction should at any time become necessary. I am inclined to believe the case observed by M. P. Dubois, at the obstetrical clinic of Paris, in 1837, the details of which are furnished by M. Voillemier, in the *Archives Générales de Médecine*, belonged to this particular variety.

3. *Tubo-ovarian Pregnancy*.—In this, the cyst, which surrounds the foetus, is formed partly by the ovary, and partly by the opening of the dilated tube, whose extremities have contracted some adhesions with the ovarian tunic.

The following case of Dr. Jackson's is justly quoted by M. Dezeimeris as serving for a type: a woman, aged thirty-two years, was seized, in consequence of a violent blow on the epigastrium, with some inflammatory symptoms, to which she speedily succumbed; and at the autopsical examination, a large quantity of blood was found diffused in the abdomen, and a foetus of about ten weeks was found enveloped in an enormous clot; the fundus uteri rested against the pubis and its cervix, near the middle of the sacrum. This change from its natural position had been produced by a tumor situated on the left side of the womb, which tumor was formed by the ovary, the Fallopian tube, and the broad ligament, that had become considerably thickened and modified in their structure; the fringed extremity of the tube adhered intimately to the ovarian envelop, and a cyst was formed by these two organs, whose distension by the body contained therein had produced the rupture.

In another case, related by Bussières, which seems to me equally conclusive, the tube on the right side was extremely dilated at the extremity; and this dilatation, which was an inch in its largest diameter, extended for rather more than an inch and a half in length, gradually diminishing as it approached the womb. The portion of the tube thus dilated was curved on itself, and embraced nearly the whole ovary, to the membrane of which it was so adherent that it could not be separated without rupturing the attachments. An unctuous, limpid fluid escaped, as soon as it was opened, and then the ovule appeared, which was about the size of a hazelnut, and was surrounded by the liquid; three-fourths of it had already escaped from the hole made in the ovary, so that it no longer seemed to rest

there; yet, on attempting its removal, it was found attached by a hard pedicle covered with blood-vessels.

4. *Tubo-abdominal Pregnancy*.—It is evident that, if the tube be obliterated near the enlarged extremity, the ovule which has scarcely entered its canal will be arrested; and if the development occurs at this point, the tubal walls must necessarily be dilated, and one portion of the ovum's surface must be free in the abdominal cavity; the gestation then bears the name of the *tubo-abdominal*, the placenta being attached in the interior of the tube, and the foetus developed in the abdominal cavity, and both surrounded by a cyst, the walls of which are partly made up by the parietes of the tube.

5. *Tubal Pregnancy*.—This is the most frequent of all the varieties of extra-uterine pregnancy; which fact is readily accounted for by the length and narrowness of the canal and by the adhesions and morbid obliterations presented by its walls. Under such circumstances, the ovule is arrested and developed at some point between its abdominal extremity and the spot where it enters the uterine parietes; and by continual growth it then distends the fibres of the tube which constitute the envelop of the foetal cyst beyond measure. To the numerous cases of this kind reported by Velpeau and Dezeimeris, I might add another, already published by me in the *Bulletin de la Société Anatomique*, but so many examples are everywhere met with that it seems useless to reiterate their details.

6. *Interstitial Tubo-uterine Pregnancy*.—In an anatomical point of view, it is important to distinguish this variety from the succeeding one, with which most authors have confounded it, for it exhibits the peculiarity of the ovule being arrested in that portion of the tube which traverses the substance of the uterine walls. At this point the parietes undergo a considerable distension, and press back the surrounding proper tissue of the organ, so that the latter always forms the most internal part of the cyst that encloses the product of conception, and consequently the uterine extremity of the tube is often imperforate.

7. *Interstitial Uterine Pregnancy*.—Again, the ovule reaches that part of the tube which traverses the uterine walls; but having arrived there, it opens a way through the tubal parietes, penetrates into the midst of the fibres of the womb, and thenceforth has no further relation with the tube, and hence the surrounding cyst is formed by the muscular fibres of the womb alone.

This anomaly appears wholly inexplicable, without referring it to the abnormal canal previously described (p. 76), the existence of which can alone, in my estimation, account for the disposition here manifested. After having been once located among the uterine fibres, the ovum may either take an inward or an outward direction, and consequently may become seated near to the mucous layer, or else to the peritoneal coat. In a preparation belonging to M. Pinel Grandchamp, the volume of the uterus was about the same as at six weeks or two months of pregnancy; a tumor appeared at the left angle, which had a small opening made in it behind; this tumor constituted a sac containing the product of conception, and the tube

passed behind it, exhibiting no other communication with the cyst than an orifice that was almost microscopical ; the tube itself presented no augmentation of calibre at any part of its extent, and the cyst was about large enough to hold a filbert.

8. *Utero-tubal Pregnancy.*—Notwithstanding the free communication existing between the tube and uterine cavity, there is no absurdity in the supposition that the ovule may become deposited in a little depression of the mucous membrane, and there stop and engraft itself, just at the internal orifice of the canal. In this case, phenomena similar to those of the tubo-abdominal gestations will arise ; that is, the ovule which may have contracted some intimate adhesions with this extremity, may by its development encroach upon the uterine cavity itself ; and I do not hesitate, therefore, to consider this variety of gestation as being possible.

9. *Utero-tubo-abdominal Pregnancy.*—In this species, examples of which have been furnished by Patuna, Hunter, and Hoffmeister, the foetus is found in the abdominal cavity ; the cord leaving the umbilicus enters the Fallopian tube, traverses its whole length, and is inserted in the placenta, which itself is attached to the internal surface of the uterus. However extraordinary these facts may appear, I think that no one can doubt them after reading the subjoined case, taken from the memoir of M. Dezeimeris.*

* Helen Zop, aged 35 years, had been married for twelve years, and had given birth to eight children, two being twins.

As she was preparing for church on Sunday, July 10th, 1763, she was suddenly attacked, after a violent fit of anger, with a profuse flooding and the pains of childbirth (being then at term) ; however, she did not pass the waters, but what proved to be pure blood ; and she felt the motions of her child up to the last moment. The midwife summoned on the occasion, declared at once that the accouplement was at hand ; but, after the lapse of several hours, as the loss of blood continued without any positive signs of an approaching delivery, a physician and a surgeon were simultaneously sent for, the former of whom soon arrived, and recognizing at once the imminence of the danger, he ordered the administration of the sacraments, at the same time prescribing divers remedies for the discharge. The venesection of the cephalic vein was followed by a profound syncope, without causing the least abatement of the metrorrhagia, and the sacraments had scarcely been administered, when the patient died, at 11 A. M. on the same day.

Patuna and his father (the public surgeon to the city) arrived just as she was expiring. After assuring himself of her death, he immediately made a Cæsarean section upon the right side, where the abdomen offered the most resistance, and, as soon as the ventral walls were divided, an enormous foetus, resembling a child two months old, presented itself ; the position was such, that its back corresponded with the abdominal parietes of the mother ; the head was somewhat inclined, was directed towards the vertebrae, and rested immediately under the diaphragm ; the knees flexed towards the head, the right hand upon the thighs, and the left near the navel : the umbilical cord was of a considerable length ; it ascended to the right, wound around the neck, and then entered the Fallopian tube on the right side. A case of extra-uterine pregnancy being new to Patuna, although acquainted with most of the published examples, his researches were made in the most careful manner.

Having enlarged the opening made in the abdomen, so as to examine its cavity to better advantage, he sought for the foetal envelops with all possible attention, but in vain ; for he neither found the amniotic liquid, nor fluids of any other kind in this cavity. By tracing the umbilical cord with his hand,

10. *Abdominal Pregnancy*.—The long-contested question of abdominal gestation is now established by so many facts, observed both in the human female and in animals, that we can no longer justly deny its possibility. No doubt the ovarian or other pregnancies have often been confounded with it, but in most of the published cases it is incontestable that the ovum had no relation with the internal genital organs whatever.

M. Dezeimeris has divided the abdominal gestation into *primitive* and *secondary* varieties; in the former of which the product of conception has never had any other domicil than the abdominal cavity, into which it fell immediately on quitting the ovarian vesicle; in the latter, on the contrary, the ovule was first developed in the ovary, the tube, the walls, or the cavity of the uterus; but the excess of distension, or some pathological alteration in the parietes of the tumor, has destroyed the continuity, and the ovule, being driven wholly or in part from the containing cyst, has escaped into the abdominal cavity, where it is subsequently found. But I cannot admit any such distinction, for the secondary abdominal pregnancy of M. Dezeimeris seems nothing more than an ovarian, tubal, or interstitial gestation, which is terminated by the rupture of the primitive cyst; and whether this rupture takes place at an early period or only at the regular term of gestation, it can only be considered as a mere anomaly, and in no case can it constitute a distinct variety.

We shall therefore restrict the term *abdominal gestation* to that species in which the ovule, at the commencement, engrafts itself on a part clearly separated from the internal genital organs. The spot where this may take place varies almost *ad infinitum*, the placenta

he found that it penetrated into the right tube at the distance of a finger's breadth from the uterus; the uterine portion of the tube was more voluminous than that part which ran to the ovary, whence he judged that the cord passed through the former into the womb.

This organ was larger than the fist, and had the natural pyriform shape, but not the least vestige of any rupture; not the smallest cicatrix could be seen; it hardly rose above the pelvis.

These observations being concluded, Patuna incised the tube along its interior from the entrance of the cord towards the uterus; this presented nothing peculiar, excepting the adherence to the cord where the latter perforated it. The uterus was then opened, and exhibited no trace in the interior of any previous laceration whatever; the walls were an inch and a half in thickness, and their substance was nearly bloodless; the placenta was found internally adhering to a narrow space at the fundus, a little to the right; it extended more towards the left, but was there detached. It was about two fingers' breadth in thickness, and four inches in diameter, and it commenced very near the uterine opening of the right tube, and adhered more strongly there than at any other place. Some vascular extremities were clearly manifested both on its convex surface and at the fundus uteri upon which it was engrafted; its concave face, from the middle of which the cord arose, was covered by two membranes, one, the interior, being thicker and vascular, while the exterior was very thin and translucent, but these joined when they approached the border of the placenta, forming there a more solid substance, and having some very delicate vessels ramifying through it. The internal uterine orifice would hardly admit the little finger.

Everything else remained in a natural state, excepting the change in the situation of the intestines. (*Barthelemy Patuna.*)

being sometimes known to adhere to the peritoncum covering the right or the left iliac fossa, sometimes to the mesentery, or a portion of the large or the small intestines, again at others to the anterior abdominal parieties.

We have not been able, from the restricted limits of this chapter, to bring forward a larger number of cases, but sufficient has been said to furnish an idea of the importance that ought to be attached to the different varieties of extra-uterine pregnancy admitted by us.

The reader may consult with benefit the article of Professor Velpeau, in the fourteenth volume of the *Dictionnaire de Médecine*, the learned memoir published by M. Dezeimeris in the fourth year of the *Journal des Connaissances Medico-Chirurgicales*, and the able articles of Messrs. Breschet, Menière, and Guillemot.

The physiological and pathological history of these different pregnancies still remains, however, to be furnished, and we shall commence with their pathological anatomy.

§ 1. PATHOLOGICAL CHANGES.

The anatomo-pathological examination of extra-uterine gestations evidently comprises the peculiarities offered both by the product of conception and the tissues of the mother.

A. *Product of Conception*.—In these pregnancies the ovule has its proper membranes, the chorion and the amnios. I may state that I was utterly astonished to hear several honorable members contend, in a recent discussion before the Academy of Medicine, that the envelop of the ovule, in abdominal gestations, was only composed of the amnios, and that no chorion existed; for although, in certain very old pregnancies, the most exterior foetal membrane is confounded with the walls of the cyst, yet it is not fair to conclude, from such premises, that this membrane did not exist at the commencement.

Indeed, it is only necessary to recall our remarks on the mode of development of the ovum, to comprehend that the absence of the chorion supposes that of the allantois, and without the latter no circulatory relations can be established between the embryo and its mother.

In the sub-peritoneo-pelvic gestation, or whenever the ovule, that was originally located in the ovary, tube, or even the uterus, is transferred, after the rupture of the cyst which enclosed it, to some part of the abdominal cavity, there is besides a pseudo-membranous cyst, representing the uterine caducous membrane, produced by the inflammation which the presence of the ovule determines around it. But this enveloping membrane, the cyst, does not exist in primitive abdominal pregnancies. M. Dezeimeris thus explains the latter circumstance: when a fecundated ovule gets into the abdominal cavity immediately after quitting the ovary, we can readily believe that a corpuscle so minute, pliant, and fragile could only produce a very slight irritation at the point of its reception, and the extent of this excitation will not pass beyond the limits of contact with the little foreign body; in a word, it cannot produce an acute inflammation, or exten-

sive adhesions, nor an exudation of plastic lymph sufficient to form a surrounding cyst. Now, if it has not primarily caused all these derangements, the neighboring organs will not be injured by its ulterior development, because they become gradually habituated thereto; and the ovule, having obtained a right of possession, lives, grows, and presents to the smooth, polished surfaces which touch it, a surface equally smooth, polished, and moistened at their expense; and not having occasion for any other protecting envelop, no cyst is formed. But when a voluminous product of conception suddenly bursts, and its contents, placed at first like it in the tube or ovary, are transported to the peritoneal cavity, the ovule becomes there a foreign body, wounding and irritating the abdominal organs which are unaccustomed to its vicinity, and determining an acute inflammation all around, which results in the exudation of plastic lymph; and this, by coagulating, forms a cyst, and completely isolates the strange body. If, under these circumstances, the displacement of the foetus is such that it completely escapes from the amniotic cavity, and suddenly locates itself with its surrounding liquid in the midst of the intestinal mass, an inflammation occurs, and the cyst we have just described forms around it; the new cyst then completely environs the foetus. But in some cases the displacement is not so complete—the largest part of the trunk may still remain in the amniotic cavity after the rupture, a portion only being displaced, and the latter alone first determines an inflammation around it, and then the exudation, which is transformed into a false membrane; though this latter, by uniting with the lacerated margins, forms only a part of the foetal cyst, the remainder being constituted by the old foetal envelop; the walls of the Fallopian tube, for instance, in the case of a tubal pregnancy. The same relations may be established with the membranes of the ovule when the chorion and amnios are ruptured at an advanced period in a case of primitive abdominal pregnancy. For instance, in a case cited by M. Dubois, the cyst that enclosed the foetus was formed of a membrane which was not altogether uniform in its structure and appearance: thus, for the greater part of its extent, the internal surface was of a light brown color, owing perhaps to the imbibition of the adjacent liquids, and simulating, both to the touch and sight, the aspect of the mucous membrane of the small intestines, or, still better, the accidental membranes that occasionally line fistulous canals; while at other points, those for instance which were near the circumference of the placenta, and on the largest part of this surface itself, the cyst was more smooth and polished; presenting, in fact, the ordinary appearance of the amnios.

The cyst was simple, and about a fourth of a line in thickness at the part where it exhibited the brown and villous character above alluded to; but on the contrary, where the surface was smooth and polished, it evidently consisted of two membranes (the chorion and the amnios).

When an extra-uterine pregnancy is somewhat prolonged, these envelops are sometimes destroyed, by being perforated with fistulous canals, or else the openings which they make communicate di-

rectly with the intestinal canal, vagina, bladder, uterus, or an external abscess. At times, the destruction of the cyst is partial, at others complete; so much so, indeed, as to leave in certain cases no vestiges of its former existence; on the other hand, the envelope sometimes undergo osseous or cretaceous transformations, which may convert them into solid shells. As a general rule, the foetus exhibits nothing peculiar in its development; for example, in several cases studied anatomically a long time after the term of pregnancy, the osseous system appeared to have a better development than in the ordinary child of nine months. The existence of several teeth has frequently been noticed, as also occasional traces of the eruption of these little bones, which would seem to afford an indication that the foetus continued to live and grow beyond the ordinary term of gestation.

The most common of the numerous alterations, is the putrescent dissolution of its soft parts, from macerating in a compound of amniotic liquor, blood, and pus, the separation of the various pieces of its skeleton, and their discharge through the divers routes just mentioned. At other times, it seems to have undergone a kind of mummification, a complete drying up. Again, in other cases, all the tissues appear to be transformed into an osseous or cretaceous substance, or into one resembling the fat of a dead body—and here, it is doubtless unnecessary to add, it is no longer possible to discover any trace of the foetal membranes.

B. *Tissues of the Mother.*—Some very large sanguineous canals are seen to develop themselves in those parts where the ovum is attached, however devoid of vascularity they might have been previously; and several great veins are found to ramify under the péritoneum towards the circumference of the placental attachment; and where the ovary or the tube happens to be the seat of pregnancy, it presents a soft tissue, apparently fungous in character, and impregnated with blood.

The womb does not continue so indifferent to the advancement of the extra-uterine pregnancy as might be supposed; for its volume increases in a remarkable degree, the tissues become more soft, and a caducous membrane is formed in its interior, during the early stages. M. Velpeau, however, disputes this last assertion; but I have endeavored to refute his opinion in the *Bulletin de la Société Anatomique* (Sept. 1836), to which the reader is referred. We likewise frequently find a gelatinous substance, a kind of thick, ropy mucus, in the neck of the uterus; but when the pregnancy has advanced beyond term, the womb gradually regains its natural condition. Finally, in certain cases, the calibre of the Fallopian tube has been found obliterated at some part of its length. (*Vide*, page 156, *et seq.*)

§ 2. PROGRESS OF EXTRA-UTERINE PREGNANCY.

During the early months, it is exceedingly difficult to recognize the existence of an extra-uterine pregnancy; for the modifications which then occur in the size, form, and consistence of the body and

neck of the uterus, will certainly lead to an error, and give rise to the belief of a true gestation. With regard to the menstruation and the lacteal secretion, no constant rule is observed. Sometimes the menses continue to appear; at others they do not. In some instances this function is not re-established, even after the period when the accouchement should have taken place; and similar variations are met with in the secretion of milk. Again, menstruation has been known never to appear during an extra-uterine pregnancy, which lasted more than thirty years, while the lacteal flow continued throughout the whole of that time.

There are, likewise, some abdominal pains, at an epoch not very distant from the date of conception, more or less analogous to the uterine pains, and at times a constant, fixed, circumscribed one in the pelvis, groin, or umbilical region. (The woman whose preparation I presented to the Anatomical Society, had on this account been treated for a partial peritonitis.) Not unfrequently, there is an inability to lie upon one side, and it has been observed that the labour-pains come on at the natural term, or at the seventh month, or even sooner, generally lasting for three or four days, but occasionally much longer; and, should the pregnancy be unusually prolonged, these pains are apt to return at varied intervals, and again pass off.

Schmidt reports a case where the gestation lasted three years, in which the labour-pains were renewed eight times, and on each occasion continued for several weeks.

In another gestation, of ten years' duration, the pains annually returned at the period corresponding to the term of pregnancy.

These pains are not produced by the contraction of the cystic walls, as many have stated; because, excepting the cases of tubal and interstitial pregnancy, they never contain any muscular fibres, and hence we must search for the cause in the uterus itself; for the great development exhibited by this organ, and the mucous and albuminous matters enclosed in its cavity, the expulsion of which requires some contractions, sufficiently account for these various troubles experienced by the patients. But it is exceedingly difficult to explain in a satisfactory manner the frequent coincidence of such pains with the usual term of gestation.

The physical signs which require our notice, are the changes in the uterine body and neck, just indicated, the more or less irregular development of the belly, and the possibility (in some cases) of distinguishing two tumors, one being the uterus, while the other is formed by the abnormal cyst.

In the sub-peritoneo-pelvic variety, the product of conception, by occupying the pelvic excavation, displaces and compresses the organs found there; the vagina and rectum, for instance, and pushes them to one side. Frequently, the different parts of the foetus may be detected by the vaginal touch; and further, the uterus, being pressed upwards and forwards, has its axis against the pubes, and its fundus projecting in a variable degree above the level of these bones.

The foetus seems to be much more superficially placed in the ab-

dominal pregnancy than in any other variety ; hence its movements are more easily perceived, and are more distressing to the mother, and the forms of the different parts more clearly distinguishable. Besides, the rounded and regularly circumscribed tumor formed by the uterus in a normal gestation is no longer to be traced out.

In the tubal and ovarian varieties, says Baudelocque, the foetal movements should be less vague, and its limbs more retracted. The body of the uterus is associated with the tumor formed by the foetal cyst, and can neither be separated nor readily distinguished from it.

I have thus brought forward the various signs by which authors endeavor to detect the different species of extra-uterine gestation, although they have, in my estimation, but little practical importance ; nor do I see that auscultation itself could render us much service in determining the diagnosis.

I ought to observe that the non-exclusion of the possibility of a fresh fecundation is a feature common to all the different varieties of extra-uterine pregnancy.

Perhaps it may be serviceable to note that the vacuity of the uterus might be detected by the touch, for very frequently its habitual position will not be maintained on account of its being pressed by the tumor, more especially when the latter occupies the excavation and it will be strongly driven against some part of the pelvic walls.

The duration of extra-uterine pregnancy is very variable ; terminating, in some cases, in a few weeks, or months ; whilst in others, it lasts for several years. When left to itself, the usual termination is by a rupture of the cyst ; but the time and consequences of this lesion are exceedingly uncertain, though, were we to arrange these pregnancies according to the periods when this occurs, they might be classed in the following order : viz., the interstitial, tubo-interstitial, tubal, ovarian, sub-peritoneo-pelvic, and the abdominal.

It is very rare for the period of the rupture to extend beyond the middle term of pregnancy except in the latter varieties, and it almost necessarily entails the death of the foetus. However, there are some exceptions to this law.

This rupture always gives rise to exceedingly grave phenomena, which may be described as the primitive and secondary consequences. Thus, the patient at first suffers from violent pains for several hours, then, after a pain which is much stronger than all the others, a perfect calm comes on and continues ; the abdomen sinks, or becomes flattened, and the former tumor disappears ; a gentle and equal heat spreads over the abdominal cavity, and, if the pregnancy was well advanced, the patient feels something like a voluminous body that had been suddenly displaced ; the skin loses its natural hue, faintings come on, the pulse is small and contracted, a cold sweat covers the whole body, and is frequently followed by death ; because the rupture of the cyst is often the immediate cause of a hemorrhage that speedily proves fatal. Should any circumstance

whatever arrest the hemorrhage, the first symptoms that follow the displacement of the product of conception, and the transference of the waters, blood, or even the foetus itself, to parts not accustomed to such contact, are those of a very violent peritonitis. Thenceforth, the progress of disease is widely different, according as the debris of the gestation are to remain in a kind of cyst of a new formation, during the remainder of life, or are to be eliminated by the divers routes before alluded to. In the former case, the foetus may undergo the transformations hitherto described when treating of the pathological anatomy, and, in the latter, the symptoms will vary with the route by which the elimination is made.

Again, the death of the foetus may precede the rupture, being produced either by a default of nutrition, or by some other cause equally difficult to determine.

The foetal debris find their way to the exterior, at times by the bladder, rectum, vagina, and even the stomach, at others by means of an abscess opening into the perineum, or through the anterior abdominal parietes. Furthermore, since these latter communications are common to all kinds of extra-uterine pregnancies, we can understand that the situation of the foetus in the sub-peritoneo-pelvic variety, which, as before stated, is the most deeply engaged in the excavation, will render its expulsion by the vagina or rectum more frequent than in the others.

Most generally, some one of the above-mentioned organs serves as an excretory canal, but in certain cases several of them are simultaneously attacked by the adhesive inflammation; of course, ulceration and perforation soon follow; and the wreck of the foetus escapes at once by the anus, the vagina, and through a fistulous opening in the abdominal walls.

This expulsion greatly endangers the mother's life—for very often the inflammation and suppuration of the cyst, by spreading to neighboring parts, exhausts the patient, and sooner or later she succumbs. In the more fortunate cases, the sac is gradually emptied, cleansed, and contracted, the suppuration dries up, and the wound cicatrizes, or at least becomes a simple fistulous ulcer.

§ 3. CAUSES.

Nothing can be more obscure than the causes of extra-uterine pregnancy, although numerous facts would seem to prove that the effects of terror, coinciding with the time of fecundation, may produce such an effect as to prevent the impregnated ovule from being ulteriorly transported into the uterus; but notwithstanding the high authority of those who have adopted this doctrine, it does not appear to me admissible, since the ovule does not abandon the ovary at the moment of conception, but several days after or even several days before this event.

M. Dezeimeris brings forward one case that seems to prove that a blow on the hypogastrium a short time after a fruitful coition may be the cause of this anomaly, though I should rather refer

it to a particular disposition of the mother's organs. When, indeed, we consider the narrowness of the tubal canal, we can readily conceive that any deviations, even slight ones of the Fallopian tube, any paralysis or spasm, an excess or defect of length, an engorgement, the swelling and ulceration of the mucous membrane, or hardening of its pavilion, or any retraction at the external orifice; in one word, all the anomalies and alterations described by authors may take place there, and give rise to it. I myself have had an opportunity of observing two cases (reported in the *Bulletin de la Société Anatomique*) in which the tube was obliterated between the point where the ovule was developed and the internal orifice of this canal.*

* The obliteration of the tube in the case referred to is so remarkable an occurrence, that I endeavored to learn by referring to various authors whether similar cases had been reported; most of them have not observed the state of permeability or impermeability of the tube; others, on the contrary, have given their attention to this point. Thus, Smellie (t. ii. p. 77) quotes an observation of Dr. Fern, in which an obliteration, or rather an excessive retraction of the tube was described. In the memoir of M. Breschet, on interstitial pregnancy, I found several instances where the obliteration of the uterine orifice was also noted. M. Mayer communicated a case to M. Breschet, where the foetus was developed in that part of the tube which traversed the substance of the uterine walls; M. Mayer further remarks, that the right tube was dilated at its fringed extremity, contracted in the uterine portion, and was completely obliterated at about three lines from the uterus; the left one, in which the ovule was developed, was permeable as far as the morbid mass, but from this point to the uterus the canal ceased. He adds: it is very probable that an induration of the uterine substance formerly existed at the insertion of the left tube, which has caused the occlusion of its orifice, and has furnished an obstacle to the passage of the ovule.

M. Schmidt reports that in an example of interstitial pregnancy, of six weeks, the internal orifice of the right tube was completely closed. (The ovule was developed on the right side of the womb.

M. Menière (*Archives*, June, 1826) furnishes a case of interstitial pregnancy located in the left cornua, and he says the left tube was impermeable at its internal part.

M. Gaide, in a similar instance (*Journal Hebdomadaire*, t. i.), ascertained that the right tube had no uterine orifice.

Another case is reported in the *Archives* of a mortal hemorrhage produced by tubal pregnancy. The author adds: "The left tube (the ruptured one) formed a consistent membranous sac, and its free extremity embraced the whole ovary; below the dilatation, and in the uterine portion the canal was completely obliterated, in such a manner that it was wholly impossible to reach the uterus through it."

I might cite a greater number of examples, but I think these will suffice to prove that an obliteration of the tube is sometimes met with in extra-uterine pregnancies; for whenever we find the canal effaced between the ovule and uterus in a tubal gestation, it seems natural to suppose that, if the product of conception has been arrested in the course it has to travel in order to reach the uterus, some mechanical obstacle has opposed its passage, and that the effacement is the cause of such hindrance in the progress of the ovule: consequently, the cause of this variety of gestation, at least, seems to me clearly indicated. But how long has the effacement existed? Was it prior or subsequent to the conception? In reply, it may be said that, according to the ideas generally admitted by physiologists, an obliteration of the tubes is an infallible ground of sterility, and when met with in a pregnant woman it would be absurd to suppose that such an obstacle was in existence before impregnation.

§ 4. TREATMENT.

It is evident that no operation could be attempted in the earlier months of pregnancy, even if we should be fortunate enough to

In this case, the seminal fluid could not reach the ovule, for its only way is closed up, and the fecundation cannot occur.

Let us examine, however, whether this is the only admissible opinion; it is well known that the obliteration of a canal, lined internally by a mucous membrane, can only result either from the coagulation of a secreted liquid, the chronic engorgement of its walls, or from their adherence to each other; and in either of these cases it is necessary to suppose the existence of a previous inflammation; but in neither of the instances mentioned have I noticed that the females exhibited any peculiar phenomena during the early periods, those immediately following the fruitful coition. Again, even supposing the inflammation is latent, and too feeble to produce any sensible effects, we must admit that its progress has then been very slow, and that it could not determine an obliteration of the walls (whatever be the mode of its action) until after the lapse of a considerable time; now the ovule, at the very outside, arrives in the womb about the tenth day, and therefore the inflammation and the subsequent effacement must take place within that short period; but, even admitting this hypothesis to be true, some cause for this phlegmasia in the tube must be assigned, and the partisans of that opinion have not hesitated to assert that it is either produced by the irritation, and the sanguineous congestion, experienced by all the genital apparatus at this period, or by a spasmotic condition of the tubal walls, or, further, by the presence of the ovule itself.

I shall merely reply to this perfectly hypothetical explanation, by presenting a single fact. It is this: in some of the cases related in the memoir of M. Breschet, and in several others from different writers, not only was the tube that served as the seat of gestation obliterated, but also the one on the opposite side; and consequently in these instances, at least, we cannot admit that a spasm of the walls, or any irritation from the ovule's passage was the cause of effacement, and therefore we have to believe that it existed previously.

From all which it follows, as a natural consequence, that, contrary to the opinion generally received, it is not necessary for the sperm to pass successively through the uterus and the Fallopian tube, so as to approach and fecundate the ovule; and further, this conclusion permits the adoption of certain facts which have been rejected as improbable; for we can explain by it how, in some females, there may happen to be a complete occlusion of the os tinctæ at the period of labour; how, in others, the fecundation has taken place without a proper introduction of the membrum virile, the physical proofs of virginity even remaining at the time of labour.

But how then can conception be explained? Without adopting the theory of the *aura seminalis*, Chaussier, Mad. Boivin, and M. Dugès thought it was only necessary for the spermatic fluid to be deposited at the entrance of the vagina, so that, by absorption, it might be taken into the circulation, and then be brought back through the blood-vessels to the ovary, where the fecundation occurred. This hypothesis would indeed explain all the anomalies; but it is not founded on a single anatomical fact, nor yet upon any direct experiment, and further, it is at variance with the researches of modern ovologists; so of course I shall not dwell further upon it.

Perhaps comparative anatomy might throw some light on the question before us: thus, in certain mammiferæ, such as the hog, cow, &c., the Fallopian tube is not the only canal that affords a passage to the sperm; for M. Gartner, of Copenhagen, has announced the existence of a particular duct in these animals, which extends from the external parts through the substance of the broad ligaments. In 1826, he came to Paris, and, conjointly with M. de Blainville, made some new researches on this point, the results of which the French naturalist has communicated to the public in the *Bulletin de la Société Philomathique*, t. 9, p. 109, 1826. The latter says, that if the vagina of a young sow be carefully examined, a particular canal will be discovered, having its external orifices

ascertain with certainty that the ovule was not developed in the uterus.

It is my opinion, however, that frequent copious bleedings should be resorted to in such cases, for the double purpose of causing the death of the foetus, and of preventing (possibly) a congestion, or rather too great a determination of blood towards the point at which the ovum is being developed.

on each side of the meatus urinarius, and running through the muscular fibres of the vagina; it becomes constricted near the neck of the uterus, but does not the less continue in the uterine tissue. This canal at first follows the body of the womb, then abandons it, and runs in the substance of the broad ligament parallel to the corresponding cornua and close to the origin of the Fallopian tube, where it is lost by seeming to spread out, or to subdivide in two or three filaments, which can scarcely be distinguished from the vessels, and more especially from the proper tissue of the broad ligament.

M^r. de Blainville says he has searched in vain for similar canals in women, but he has not met with anything of the kind. Analogy, however, renders their existence probable in the human species; and this probability becomes still stronger from the account of a case communicated by M. Baudelocque to the Académie de Médecine (*Arch. de Méd.*, 1826), as an unique anomaly in the science; although it is a very singular fact that Dulaurens, according to the report of Maurieau (*Traité des Maladies des Femmes Grosses*, p. 12, t. 1), had several times observed that the tube, after arriving at the angle of the uterus, separated into two distinct canals, the larger and shorter of which was inserted in the fundus uteri, while the other, being narrower and longer, terminated at the neck, near its internal orifice.

De Graaf (*Opera Omnia*, p. 212) thought he had found canals in women similar to those described by M. Gartner as existing in certain mammiferae.

Lastly, Mad. Boivin declares she has met with cases analogous to the bifurcated canal of M. Baudelocque. Hence, in these examples, at least, there is good ground for supposing that a conception may occur, even when the internal orifice of the tube is wholly obliterated.

Now, if, as Maurieau and Dulaurens say (whose researches the modern authors seem to have entirely overlooked), such anomalies were found at a period when dissections were much more rare than at the present time, we may conclude that, if the writers of our own day have not realized that disposition, it is because their efforts are not directed to the same end.

I shall close these remarks by bringing forward a case reported in the 2d volume of the *Journal Hebdomadaire*, An. 1829, as follows: a young woman, aged 21 years, died at la Charité in consequence of a vertebral caries. At the autopsy, the uterus was found as large as the pregnant organ at six weeks, and its enlarged cavity was occupied by a false membrane having just the same shape, but in which no opening was discovered. The adhesions to the walls were easily broken up, and three or four ounées of a yellowish liquid were found enclosed within. No trace of the internal orifice of the tubes existed, and they were equally obliterated at the free extremity. The long diameter of the ovaries exceeded an inch in length, and their surfaces exhibited evident traces of numerous eiaeatrices. Both of them contained in their interior a rounded body of a brownish red color (a true corpus luteum), and small fibrous pouches were detected in several places, with wrinkled and retracted walls. Numerous little ovoidal bodies about the size of hemp-seed, resembling the ovules, existed along the course of the tubes and in the thickness of the broad ligament.

It was very remarkable in this case that, notwithstanding a complete obliteration of the tubes, the organs of generation were found in a condition similar to what is observed at the commencement of the generative action. However, I shall deduct no direct conclusion therefrom; but I would ask your attention to the confirmation it affords of the ideas promulgated in this report (Report of M. Cazeaux, extracted from the *Bulletin de la Société Anatomique*).

Indeed, it seems clear to me, that not only does the constantly increasing weakness of the cystic walls, but also the local congestions so common during pregnancy, contribute to the more frequent rupture of the cyst.¹

Vcnesection, practiced within the limits authorized by the general health of the patient, will be the more indicated here, as its unfavorable influence on the child's life is not to be dreaded, since its death is the most fortunate event that could occur. But if no obstacle can be opposed to the incessant development of the infant, every operation must be proscribed at this period for extracting the foetus from its mother's body, because an operation would be as dangerous as the anticipated accident. Furthermore, when the spontaneous rupture of the cyst during the early stages would create a just fear of a mortal hemorrhage, we can only employ those general means which are the best calculated to prevent profuse discharges, such as rest, refrigerants, &c. Again, supposing that a clear, well-marked case of extra-uterine pregnancy has advanced almost to term, or that the labour has actually commenced, we may still justly dread the laceration of the cyst as a consequence of the mother's expulsive efforts; and the question then arises whether gastrotomy, which has been successfully practiced in similar cases, ought to be resorted to. If the child's safety be alone considered, this question is easily resolved. But is not the life of the mother almost necessarily compromised by such an operation?

How shall we persuade the patient that it is the proper period for operating, when she herself does not suspect the danger she encounters by refusing? Or how, indeed, can we ourselves decide, when the possible consequences are foreseen, the whole difficulties of a delivery appreciated, and the necessity staring us in the face of leaving open in the abdomen, a vast cyst, the inflammation and suppuration of which are so difficult to dry up, and are of themselves sufficient to endanger the sufferer's life?

In such cases, who can doubt, says M. Dezeimeris, that, if there was any measure at all that could suspend the commencing labour, the ties of humanity alone would render its employment a duty? And I fully embrace the same opinion.

Now among the means calculated to restrain the ordinary uterine contractions, I know of nothing more serviceable than opium, when exhibited in large doses per anum, and I certainly should not hesitate to employ it under these circumstances; but if the labour continues, notwithstanding its use, gastrotomy may then be authorized; but where a prolongation of the travail has produced a rupture of the cyst, no operation would be permissible.

But the primitive phenomena being once calmed, whether there be a rupture or not, our art may evidently interpose to prevent the consecutive accidents that have been enumerated, and which compromise to so great an extent the health and even the life of the patient. Hasty action, however, is unnecessary, especially after the laceration of the cyst.

In fact, a considerable period is requisite in such cases for the development of a new cyst around the displaced parts, and a certain length of time is necessary for the adhesions to form between them and the adjacent parts, and it would be exceedingly rash to interfere with this salutary action by any inopportune operation on our part. In old abnormal pregnancies, the resources of art vary with the particular case. Sometimes, indeed, an eliminatory effort has already commenced by an inflammation of the integuments placed just in front of the tumor, whereby an abscess is formed; and the only question then is, whether to open it, or by suitable incisions to enlarge the spontaneous solutions of continuity; in either case we encounter a vast abscess, which must be emptied and cleansed by the usual methods.

When some portions of the foetus get into the bladder, and we are assured of that fact by catheterization, the operation for stone may be practiced either through the vagina or by the hypogastrium. Again, a woman may present herself with an extra-uterine foetus of one or two years' standing. Can the resources of art afford her any relief? We reply, that if the gestation is a source of severe suffering, and it renders her incapable of discharging her duties; and if, besides, the tumor may be reached through the vagina without difficulty, the vaginal incision should doubtless be performed. But if she is otherwise in good health, would it be prudent to interfere for the mere purpose of anticipating the accidents to which she will probably be afterwards exposed? Or is there any ground for hoping to extract the foetus en masse, by a prudent and methodical operation? This last question is far more difficult to solve. In a case of this kind, where the head of the foetus, from being wedged at the superior strait, could readily be felt through the posterior-superior part of the vaginal parietes, I knew Professor P. Dubois (notwithstanding sharp opposition from several of his brethren, in consultation) to resolve upon incising freely the vaginal wall, as well as the cystic envelops, intending to apply the forceps on the head, and thus extract the foetus bodily; but the walls of the cyst and vagina having been cut through, an intimate adhesion was discovered between the former and the foetal head, which caused the operation to be abandoned. It was not without benefit, however, for in the course of a few days it was followed by the discharge of a putrid mass, comprising all the soft parts of the foetus; the detached bones of the skeleton were gradually extracted by the aid of long pincers, and frequently repeated injections; the cystic walls contracted slowly; and when, at length, nothing remained, and the parietes were cleansed, the opening gradually closed up, and by the end of two months the patient was completely cured. At the time of operating she had been pregnant twenty-two months.

This plan, I think, ought to be followed up in similar cases, more especially if the female's health is visibly affected.

The incision by the rectum has been practiced in some few instances where the vulva was obliterated.

Finally, gastrotomy alone would be practicable when the foetus, from its high situation in the abdomen, is inaccessible by the vagina or rectum; but this operation must be regarded as the last resource, and only to be resorted to where the patient's life is seriously endangered.

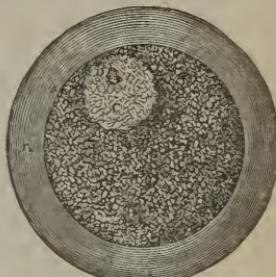
BOOK III.

OF THE HUMAN OVUM AFTER FECUNDATION.

THE human ovule, prior to fecundation, and at its full maturity, is composed, as previously stated (page 66): 1st. Of the vitelline membrane, or the envelop. 2d. Of a granular liquid contained in this membrane, and called the vitellus (yolk). 3d. Of a little vesicle enclosed in the first, and situated in the midst of the granular liquid. (This is the germinal vesicle, originally discovered by Purkinje, in the eggs of birds, and subsequently demonstrated by M. Coste as existing in those of mammiferae.) 4th, and lastly. Of the germinal, or prolixerous spot (*macula germinativa*), which is detached from the clear contents of the germinal vesicle, and is held in suspension in the fluid which the latter contains. But if the ovule be examined several weeks after the fecundation has taken place, it will be found to have undergone some very remarkable transformations; for it is then composed of such different parts, that if comparative anatomy had not furnished us opportunities of observing, step by step, and hour by hour, the divers modifications it passes through before the organization is fully completed, we could not believe it to be one and the same product; thus, at the end of the second or third week after fecundation, it exhibits some very different elements to the observer; for example, we encounter, in passing from without inwards, 1st. The *chorion*, a thick exterior membrane, studded with numerous villosities. 2d. A much thinner membrane, situated more internally, and designated as the *amnios*. 3d. A more or less considerable space between these two envelopes, that is filled up by an albuminous liquid, in the midst of which a little vesicle (the umbilical vesicle) is placed. And 4th. A liquid fills the cavity of the amnios, the quantity varying with the period of pregnancy, and in this fluid floats the embryo.

Fig. 26.

A non-fecundated human egg, or ovule.



A. The vitelline membrane, or transparent zone. B. The vitellus, or yolk. C. The vesicle of Purkinje, or the germinal vesicle. D. The germinal spot.

A thick exterior membrane, studded with numerous villosities. 2d. A much thinner membrane, situated more internally, and designated as the *amnios*. 3d. A more or less considerable space between these two envelopes, that is filled up by an albuminous liquid, in the midst of which a little vesicle (the umbilical vesicle) is placed. And 4th. A liquid fills the cavity of the amnios, the quantity varying with the period of pregnancy, and in this fluid floats the embryo.

Finally, let us add that the ovule is enveloped nearly throughout by a double membrane, which at first is entirely foreign to, but subsequently contracts intimate relations with it; this is the caducous membrane. But before studying the constituent parts of the egg at an advanced period of its development, let us see what is their proper commencement, and how they can arise out of the simple elements that form the ovule prior to conception.

CHAPTER I.

DEVELOPMENT OF THE HUMAN OVUM.

WHEN the ovule has attained its full maturity, the vesicle in which it is enclosed becomes (doubtless, also, by the influence of coition) the seat of an excitation which determines there a considerable afflux of fluid, and causes its distension more and more; and as a consequence of this distension, the vessels on that portion of the vesicle which projects the furthest from the surface of the ovary become atrophied, and their walls grow thinner; in fact, the latter soon give way, and thereby permit the ovule to escape, which passes out, drawing along with it a part of its granular cumulus. The ovum then engages in the tube, whose enlarged extremity had been applied to the ovary; but it must not be supposed that the period for the ovule's arrival in the tube is invariable in the same species of animals, and it probably varies in the human race also; but nothing positive is known on that point. Pending its stay in the ovary, the ovum underwent no appreciable modification; but as soon as it has entered the oviduct, the beginning of those changes it must necessarily pass through in order to give birth to a new being is observed; and hence, to study these modifications in due course, we must first examine those manifested in the tube, and then such as do not appear until after its arrival in the uterine cavity.

ARTICLE I.

CHANGES OF THE OVUM IN THE TUBE.*

After the ovum is once deposited in the oviduct, it is no longer possible to find either the vesicle or the germinal spot; and this dis-

* It has heretofore been always impossible to study these changes in the human egg, and the description we are about to give is the result of observations made on the eggs of mammiferae, especially of the dog and rabbit; but analogy favors the belief that similar phenomena take place in the human species; indeed, the strongest resemblance exists between the ovum of the latter and the unfecundated egg of a bitch; besides, the youngest ova that have

appearance of the vesicle, and the accumulation of granules about the centre of the ovum, constitute the first modification the latter undergoes subsequent to its departure from the ovary.

In the first half of the tubal canal the ovum is environed by a layer of granulations of variable thickness, which constituted the prolixous disc while it remained in the ovary, and the vitelline membrane is somewhat thickened; but this is still the only one that can be observed around the vitellus: but when the product of conception reaches the second half of the tube, it is no longer embedded in the granulations of the disc, since they have disappeared, though a layer of a perfectly transparent gelatinous substance may be distinguished around the vitelline membrane.

During the first part of this course the consistence of the yolk augments (Bischoff), and it forms a more compact mass, and therefore does not exactly fill up the vitelline membrane, a small quantity of clear, transparent liquid being interposed between the internal face of the latter and its own proper surface. This condensation of the yolk is sufficiently marked, even after the envelop has been incised, to constitute a solid body, which may be separated by a very fine needle into two, four, or six parts.

In the second half and inferior third of the tube, the surrounding layer of albumen augments, as well as the thickness of the vitelline membrane. But, according to the statement of Barry and Bischoff, the yolk undergoes the most remarkable changes of all, for, instead of forming, as hitherto, a compact, homogeneous mass, it is divided first into two rounded portions, the number doubling successively, in proportion as the ovum approaches the womb—their diameter of course diminishing at the same time; consequently, in tracing the

Fig. 27.

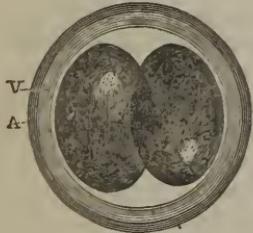
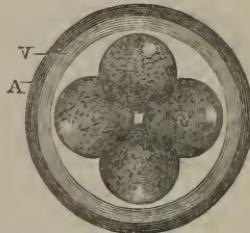


Fig. 28.



In these two figures, the dichotomous division of the fecundated egg is represented; in Fig. 27 it divides into two spheres, and in Fig. 28 each of these are again divided into two others.

A. A layer of albumen. v. The vitelline membrane.

vitellus along the duct, the whole yolk will be observed to divide in two regular rounded moieties, then into four, afterwards into eight little spheres, and finally each of the last subdivides again; so that,

been studied in the female, exactly resemble those which have arrived at a certain degree of development in animals. It is, therefore, extremely probable that if they are endowed with the same organization before conception, and still exhibit a perfect resemblance after the fecundation, they must have passed through similar successive transformations.

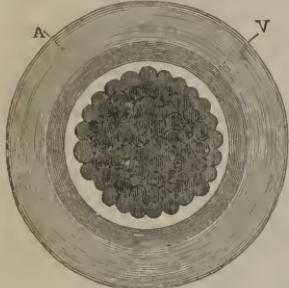
by reason of these successive subdivisions, the vitelline spheres become smaller and smaller, and ultimately terminate by causing the whole mass of the yolk to resemble a mulberry in appearance. The yolk is in course of dissolution at the period when the ovum arrives

in the womb. The time necessary for the egg to traverse this passage is very variable in different animals, and even sometimes in the same species; thus, according to M. Coste, the ovum of rabbits does not reach the uterus before the third or the fourth day, whilst in the bitch, it has been found in the tubes as late as the tenth, twelfth, or even fifteenth day; and we have formerly stated that, in the human species, no one case has ever proved its existence in the womb prior to the twelfth day. However, it is well to remark with Bischoff, that, as a general rule, the passage is very slowly effected, more especially through the last third of the tube, owing, perhaps, to the excessive narrowness of this portion of it.

The fecundated egg at a more advanced stage.
A. The albuminous layer surrounding the vitelline membrane v, which is seen to be thickened, and to contain within its cavity the mulberry-like mass.

Finally, the ovum augments somewhat in volume during its course, being probably nourished at first at the expense of the granulations which accompany it, and subsequently by absorbing the albuminous liquid secreted in the oviduct itself.

Fig. 29.



ARTICLE II.

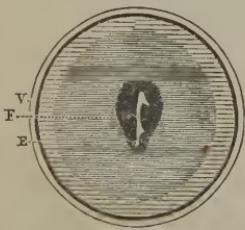
MODIFICATIONS OF THE OVULE FROM ITS FIRST ARRIVAL IN THE WOMB
UNTIL AFTER THE DEVELOPMENT OF THE ALLANTOIS.

When the ovum approaches the uterine cavity, it consists of the vitellus (together with any granulations that may remain from the decomposition of the mulberry-like body), of the thickened vitelline membrane, and a very thin layer of albumen that surrounds it. Shortly after, the vitelline granulations wholly disappear, and they are replaced by a perfectly limpid and transparent liquid. These granulations seem to be condensed on the internal wall of the vesicle, and, by their adherence to each other, to constitute there a second vesicle, enclosed by and lining the first. This second membrane is not easily recognized; but, if the example of M. Coste be followed, and the ovule be placed in water, it will become quite apparent. In fact, a very curious endosmotic phenomenon then takes place; the water passing through the vitelline membrane detaches the second vesicle in such a manner that the latter, being completely isolated, as also puckered and corrugated in every direction, floats or hangs suspended in the new liquid which distends the vitelline membrane; and to this M. Coste has given the title of the *blastoder-*

mic membrane. But while this blastodermic vesicle, or membrane, is being developed, the layer of albumen which surrounded the ovum on its first arrival in the uterus, disappears, and consequently the vitelline vesicle loses much of its thickness.

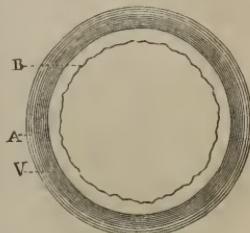
Hitherto, the ovum still remained free and without any adhesion to the uterine walls; but it commences about this period to contract more intimate relations with the latter, and hence can no longer be displaced by blowing under it. Towards the sixteenth or seventeenth day after the fecundation, a rounded, whitish spot begins to appear on some point of the blastodermic vesicle, which seems to be detached, or to stand out, like a relief; this has been called the *tache embryonnaire* (the embryonic spot) by M. Coste, and it, like the blastodermic vesicle, is composed of cellular granulations, excepting that these latter are more contracted, and are aggregated in a larger quantity at this point. (*Vide Fig. 31.*) At the same time, a minute examination is all that is necessary to convince us, that the vesicle, as also the *tache embryonnaire*, is composed of two laminæ, lying in contact with each other, but which, however, may be separated by a couple of fine needles. To render this doubling of the blastoderma more evident, we present two theoretical figures, exhibiting it at the same stage of development.

Fig. 31.



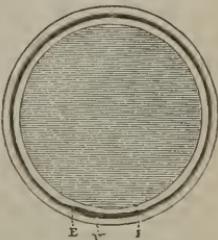
The blastoderma with the embryonic spot seen in front. *v.* The vitelline membrane. *e.* The external layer of the blastoderma. *f.* The embryonic spot.

Fig. 30.



The ovule shortly after its arrival in the womb. *a.* The diminished albuminous layer. *v.* The vitelline membrane. *b.* The blastodermic membrane.

Fig. 32.

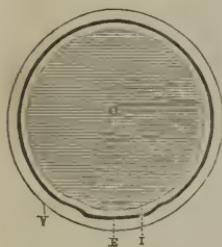


The same figure in profile, to show the two layers of the blastoderma. *v.* The vitelline membrane. *e.* The external; and *i.* the internal or intestinal layer of the blastoderma.

In the first, being a front view of the ovum, the blastoderma with the rounded *tache embryonnaire* is seen. The same figure, in profile, shows the two blastodermic laminæ, both presenting a swelling near the embryonic spot. One has been called the *external, or serous* layer, and the other is denominated the *internal, mucous, or the vegetative* one. Shortly after this period, the *tache embryonnaire* enlarges by the further addition of granules, but more in one of its diameters than in the others, so as to exchange its rounded for an elongated form.

A considerable jutting out above the external face of the blastoderma may be simultaneously noticed, which exhibits a convexity towards the vitelline membrane, and a concavity looking to the central part of the ovum (Fig. 33); and thenceforth the cavity of the blastodermic vesicle is divided into two distinct portions, the one embryonic, the other forming the umbilical vesicle.

Fig. 33.



A section of a more developed ovum, in which the two portions, the embryonic and the umbilical vesicle, begin to appear. o. The umbilical vesicle. i. The internal layer of the blastoderma. E. The external layer. v. The vitelline membrane.

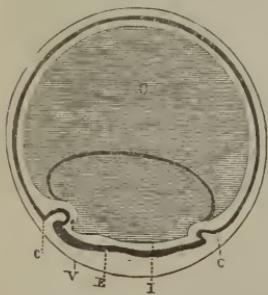
A more obscure line may soon be recognized at the centre of this spot, being the first trace of the embryo. The margins of this spot becoming folded, turn inwards, and this disposition is so marked at the extremities, as to thereby create an elongated body, having its ends swollen (in consequence of their doubling up), and a cavity of some depth at its centre. The body of the embryo is then readily distinguished, as it resembles tolerably well in shape, the body of a guitar.

The extremity that is most swollen is called the cephalic, and the other, or less voluminous one, the caudal extremity; about that time the serous lamina of the blastoderma can be traced

as continuous with the most external layers of the embryonic body, whilst the mucous one forms its internal plane. In proportion as the embryonic spot loses its distinctive characters, numerous little elevations, irregularly scattered over the external surface of the ovum, are seen to develop themselves, being, in fact, the commencement of those villosities which subsequently stud the exterior face of the chorion.

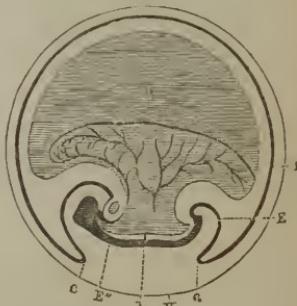
Pending the progress of these phenomena, the external, or serous

Fig. 34.



A section showing the origin and first traces of the amnion. o. The umbilical vesicle. i. The intestinal, and E the external layer of the blastoderma. v. The vitelline membrane. c. c. Origin of the cephalic and caudal amniotic hoods.

Fig. 35.



The amniotic hoods more developed. o. The umbilical vesicle. i. The internal or intestinal, and E the external layer of the blastoderma E'. A portion of the external layer converted into the amnios. E''. The embryo. c. The limit of the amniotic hoods. v. The vitelline membrane.

layer of the blastoderma (Fig. 34) is raised in folds around its central portion (which has been developed into the embryo) and more espe-

cially so at the caudal and cephalic extremities. The fold gradually augments above, below, and on the sides, in such a manner as to form a true hood over the head and caudal termination; hence named from this resemblance *capuchon céphalique et caudal* (the cephalic and caudal hoods.) These folds elongate rapidly, passing along the dorsal regions of the embryo, and ultimately come into contact with each other on the median line. (Fig. 35.) The internal lamina of this fold is continuous with the embryo, along the whole circumference of its large ventral opening; and hence this first lamina, which is originally applied almost directly to the embryo, but soon after is separated from it by a certain quantity of liquid, thus becomes its immediate envelop, and has received the name of the *amnios*, and the interposed fluid, that of the *amniotic liquor*.

As to the external layer of the fold, it is manifestly continuous with the serous lamina of the blastoderma, and although primarily applied to the preceding, it is speedily separated therefrom by the interposition of a liquid which removes them further and further from each other, until at last, its exterior face is brought into contact with the vitelline vesicle. According to some authors, these two become confounded, and by uniting form the outer membrane of the ovum; but others teach that the vitelline vesicle will be gradually absorbed (as we have endeavored to represent in the plates Figs. 36, 37, and 38), while the external lamina of the blastoderma is being developed, and the latter alone will then constitute the enveloping membrane. We embrace the former opinion the more willingly, because we have a proof that the exochorion is the primary membrane of the ovum, from its exhibiting some small irregular elevations on its exterior surface, prior to the formation of the amnios, which are the rudiments of the chorial villosities.

At the point of junction, the cephalic and caudal hoods constitute, by their union, a kind of membranous bridge which there joins the amnios to the chorion. This bridge is gradually absorbed, and the two membranes become completely isolated. (*Vide* Figs. 37 and 38.)

Such is the view most generally received on the mode of formation of the amnios. We must mention, however, one other, which, without being new, has latterly acquired considerable importance by the discussions which it has created at the Academy of Sciences.

We have just seen that the amnios is directly continuous at the umbilicus with the abdominal walls of the embryo, which is in fact so manifest, that no just ground of belief is afforded that the latter was ever independent of the amnios, as some have recently supposed. Messrs. Oken, Pockels, Serres, and Breschet have endeavored, notwithstanding, to prove that the amnios once existed as an independent vesicle, distended by a fluid; and that afterwards the foetus, by coming into contact with it, caused its depression, and became enveloped by it, like a double night-cap, but having no other relation than that of simple apposition; or, in other words, the amnios had the same connection with the embryo as the serous membranes bear to the viscera they cover.

Messrs. Coste, Velpeau, and Bischoff have combated this view successfully, in my estimation, by contending for the existence, at all periods, of the continuity we have just described, and they cannot possibly admit an opinion which is founded solely on pathological alterations; and as to myself, after examining the preparations of M. Coste, I can have no doubt as to the little value of such assertions.

Immediately after the amnios is formed, the margins of the embryonic spot, and especially its two extremities, become more and more turned inwards, thereby augmenting the concavity it previously had; and, at the bottom of the groove thus constituted, the mucous lamina of the blastoderma is observed to concur in forming the intestinal canal, which is represented at this early period by an elongated gutter, communicating freely with the interior cavity of the blastoderma. But, in proportion as this constantly increasing inversion of the lateral walls, and the extremities of the embryo progresses, this communication becomes more and more contracted, so that in a short time the intestinal cavity only connects with the blastodermic vesicle by a contracted pedicle; and thenceforth, this latter receives the name of the *umbilical vesicle*, and the vessels which are distributed to its vascular layer, consisting of two veins that enter, and an artery that emerges from the embryo, are called the *omphalo-mesenteric vessels*. (Fig. 47.)

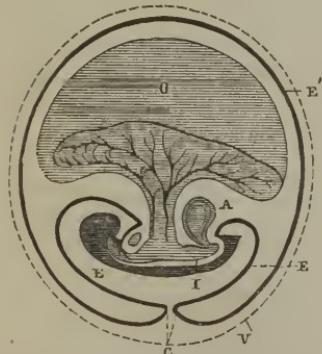
As the retraction of the ventral opening in the embryo, and the diminution of the umbilical vesicle goes on, we may observe at the inferior part of the intestinal canal, just in the region where the bladder

and rectum during the earlier days of embryonic life are confounded together under the name of *cloaca*; we observe, I repeat, the intestinal parieties to form there a slight elevation. Now, this little tumor (Fig. 36) gradually elongates, so as to constitute a minute vesicle, which communicates by its narrow pedicle with the intestinal cavity; this is the *allantois*, which has been known for a long time to exist in mammiferæ, but was first detected by M. Coste in the human ovum. The allantois is scarcely formed before it is provided both with venous and arterial vessels, consisting of the two *umbilical arteries* and one vein; the former arising from the primitive iliacs, the latter going to the liver, as may be seen somewhat later.

This figure shows the amnios almost completed, and likewise the origin of the allantois. o. The umbilical vesicle. i. The intestines. e. The amnios. e'. The external layer of the blastoderma, or the non-vascular chorion. v. The vitelline membrane. c. The amniotic folds ready to close up. a. The allantois.

This little vesicle passes through the umbilicus at first alongside of the pedicle belonging to the umbilical vesicle, and soon undergoes a rapid development; but the growth of the allantois

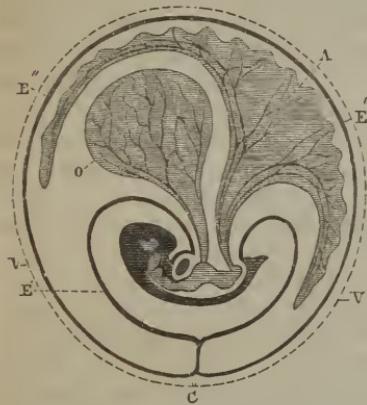
Fig. 36.



and its vessels is so rapid that it soon comes into contact with the external membrane of the ovum. In some animals, the allantois only comes into juxtaposition by its base with one point of the chorion, and becomes attached there; and then the terminal extremities of the umbilical vessels not only reach this membrane, but even extend for the most part to the villosities developed on its external surface, and acquire there a considerable growth.

In others (*vide* Fig. 37), the allantois spreads out like an umbrella around the embryo and umbilical vesicle, and embraces the whole external face of the amnios, as well as the internal one of the chorion, then the two laminæ are fused into each other in such a way as to leave no trace of the allantois (Fig. 38); though, when this view is more critically examined, it cannot be regarded as altogether exact, says Bischoff, as regards the human species, for no-

Fig. 37.



This figure shows the rapid progress of the allantois, and how it spreads over the fetus, the umbilical vesicle, and the amnios. This latter begins to ensheathe the pedicle of the umbilical vesicle, and that of the allantois in such a way as to form a commencement of the cord. According to some writers, the vitelline membrane disappears more and more. *o*. The umbilical vesicle. *E'*. The amnios. *E''*. The external layer of the blastoderma. *c*. The point where the two hoods come into contact. *v*. The vitelline membrane almost entirely atrophied. *A*. The allantois.

Fig. 38.



In this figure, the allantois has spread over the whole internal surface of the ovum, and but very slight traces are left of the continuity between the amnios, and that part of the external layer of the blastoderma which formed the non-vascular chorion; the latter has a tendency to be confounded with the chorion, and the amnios encloses the umbilical cord more and more. *o*. The umbilical vesicle. *E'*. The amnios. *c*. The point where the two hoods are fused into each other, and form but a single membranc. *E''*. The external layer of the blastoderma. *A*. The allantois. *v*. The vitelline membrane.

body has ever observed the least trace of the allantois, neither on the internal face of the chorion, nor on the external one of the amnios, and as both these are perfectly simple membranes, surely some ovum would have been found in which the fusion had not become so perfect. 2. The amnios never has vessels, and the chorion is equally devoid of them, except at the point where the allantois is attached, and the contrary should exist, as in the ruminantia and carnivora, if the allantois of women observed the same laws as it does in those animals; it is therefore probable that its base only is brought into contact with a circumscribed portion of the chorion.

The development of the allantois completes the essential parts of the ovum, although by reference to Fig. 47 it will now be found to consist: 1, of the embryo; 2, of a variable quantity of liquid in which this product swims; 3, of the amnios, being already considerably distended, and forming a sheath to the parts that pass through the ventral aperture; 4, of the umbilical vesicle situated between the amnios and chorion, whose delicate pedicle, with the omphalo-mesenteric vessels appertaining to it, however, still communicate with the intestinal cavity; 5, the pedicle of the allantois vesicle still charged with the umbilical vessels; 6, the space between the amnios and chorion, partly occupied by the umbilical vesicle, but principally filled with a liquid called by M. Velpeau the *reticulated* or the *retiform body*, according to the degree of its consistence; and 7, of the outer envelop, or the chorion.

The phenomena yet to be studied, have special reference to the enlargement of the ovum, and the development of the embryo; but before engaging with them, it is indispensably necessary to detail the changes that occur during the first fortnight of gestation on the internal surface of the womb.

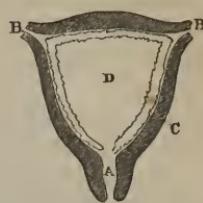
CHAPTER II. OF THE CADUCOUS MEMBRANE.

As previously stated, the uterus, like all the other genital organs, becomes the seat of a more energetic action immediately after a fruitful coition; in consequence of which the blood flows there in increased quantities, of course determining an excess of nutrition, and thus producing a marked hypertrophy in the walls of the organ; the latter is always accompanied by the secretion of coagulable lymph, a sero-albuminous fluid which soon fills up the uterine cavity; and if the mucous membrane be examined at this juncture, the villosities that existed and were exceedingly short in the unimpregnated state, will now be found, says Baér, to have undergone a considerable elongation; and as these hypertrophied villi project above the surface of the membrane, they are naturally bathed in the liquid just spoken of. In the course of a few days the latter thickens, and its exterior particles, by becoming more consistent, form a soft pulpy membrane, which lines the whole internal surface of the womb; thereby constituting a true sac that is in contact externally with the mucous membrane throughout, and is filled by a colorless, mucoid, albuminous liquid; from its position, this pouch must evidently assume the shape of the uterine cavity upon which indeed it seems to be moulded; the vascular villi of the mucous membrane appear to ramify in its substance *ad infinitum*, being accompanied by the capillary network that surrounds them, and which has likewise taken on a considerable development.

The caducous membrane frequently sends off some prolongations opposite the orifices of the tubes which engage more or less in their canals; but these processes do not always exist, although their presence is clearly established by the testimony of many authors. On the contrary, according to Hunter, it even presents a perforation just opposite to the neck and the two tubal orifices, through which a free communication is established between its cavity and the corresponding canals; but most ovologists deny the existence of such holes; and as to myself, although I have examined great numbers of ova, I have never yet encountered them in a single instance; the caduca having always been imperforate at the tubes, on this point I can have no doubt; but I am not willing to assert that a communication does not exist at the neck, because, in several entire ova (although out of the uterus), the caducous membrane, which was perfectly intact elsewhere, exhibited at this point, on examination, a kind of infundibulum, having an opening nearly one-fourth of an inch in diameter at its apex, which presented a very irregular margin. Now did this arrangement, at the inferior angle of the caduca, result from a laceration produced by the separation of the ovum? Such is my opinion; but I cannot verify it, never having had an opportunity of studying the caduca in the uterus.

The development of this membrane takes place some time before the ovule arrives in the womb; consequently, when the product of conception reaches the internal orifice of the Fallopian tube, after traversing the canal, it depresses the caduca, so as to enter between it and the uterus, and from that moment the caducous membrane presents two distinct laminæ; the most extensive of which lines the whole internal surface of the organ, excepting at the point occupied by the ovum; this is the *external*, or the *uterine caduca*; the other, being depressed by the ovule, necessarily comes into contact with some part of this product's exterior face, and constitutes what is called the *internal*, or *reflected caduca*; the *epichorion* of Chaussier. But, as M. Jacquemier has proved, this contact is not immediate; for the well-marked development of the villi on the chorion, during the early periods, must evidently remove the reflected portion to a certain extent, and this interval is extensive enough to leave a space of two lines between them, capable of receiving a considerable effusion of blood.

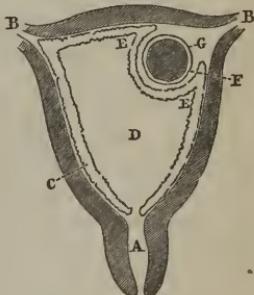
Fig. 39.



A section of the womb, exhibiting the *caduca in situ*, before the arrival of the ovum. A. The cavity of the neck. B. B. Orifices of the Fallopian tubes. C. The *caduca*. D. The cavity of the *caducous membrane*.

out of the uterus),
the *caducous membrane*, which was perfectly intact elsewhere, exhibited at this point, on examination, a kind of infundibulum, having an opening nearly one-fourth of an inch in diameter at its apex, which presented a very irregular margin. Now did this arrangement, at the inferior angle of the *caduca*, result from a laceration produced by the separation of the ovum? Such is my opinion; but I cannot verify it, never having had an opportunity of studying the *caduca* in the uterus.

Fig. 40.



The *caduca* after the arrival of the ovum. C. The *external*, or *uterine caduca*. E. The *internal* or *reflected layer*. D. The cavity of the *caduca*. F. The *chorion*. G. The *amnios*. The other references the same as in the preceding figure.

At first, the two laminæ are widely separated by the liquid that fills the cavity of the caduea ; but as the ovum increases in size, the reflected portion necessarily augments in extent, and the cavity gradually recedes ; so that about the fourth month the latter is completely effaced, and the parietal and ovarian laminæ (the *uterine* and *reflected* caduca) come into contact with each other. Nevertheless, according to Velpeau, they are never fused or confounded together at any period of gestation ; and they remain simply applied against each other, even to its very termination.

We have seen that the ovule has a portion of its exterior surface in immediate apposition with the internal face of the uterus, for several days after its arrival in the womb, whilst all the remainder of that surface is covered by the caduca reflexa ; now it is at this (uncovered) part that the chorial villosities experience a great development, and where they contract more or less intimate connections with the vascular villi belonging to the uterine mucous membrane, and hence there also the placenta will be subsequently developed.

But the arrival of the ovule does not at once suspend the former secretion in the uterus ; and it continues to go on, more particularly from the surface that is directly in relation with the ovum ; and the secreted matter, being precisely similar to that which formed the primitive caduca, thickens in turn, thereby constituting a layer of plastic material between the ovum and womb, which bathes both the chorial and the uterine villosities ; and when this deposit finally coagulates, it contributes to the formation of the placental mass, the external surface of which is in this manner necessarily covered by an albuminous layer, resembling very nearly the true caduca in character. (*Vide* Fig. 43.)

Some writers, M. Breschet among others, have contended without just grounds, that the placenta, like all other parts of the ovum, is covered by the two laminæ of the *perione* ; but no one, to my knowledge, has ever demonstrated the existence of these two layers in the utero-placental caduca, although this can very easily be done in the true membrane.

This lamina has been called the *secondary*, or the *inter-utero-placental caduca* (*decidua serotina*). Although limited to the external surface of the placenta, it soon unites so intimately with the uterine layer of the primitive caduca, that their separation becomes quite difficult at a more advanced period. This arrangement has certainly deceived a great number of otherwise very skilful observers, who have seen on the external face of the placenta (in examining ova in the womb at an advanced period) a membrane precisely similar to the uterine caduca ; with which, indeed, it seemed to be continuous, without any well-marked line of demarcation ; and who have, therefore, concluded it was one and the same ; that the caduca surrounded the ovum on every side, in the same way as the shell envelops a hen's egg.

This is an error against which we should be admonished, in view of the high authority that supports it ; for though identical in texture and origin, the primitive caduca and the *decidua serotina* differ

essentially in the period of formation, and in their relations with the ovum. In fact, the first exists long before the arrival of the ovule, while the other is only formed with the original placental elements; that is to say, at a much more advanced period, for no traces of it can be found on ova discharged during the second month. I have exhibited products of this age at the Clinic, on several different occasions, and I, as well as numerous students, can affirm that, in all of them, the ovular lamina covered about two-thirds or three-quarters only of the exterior surface of the ovum, and that the villosities appertaining to the remainder of the chorion, from being much more developed than the others, were floating free and not covered by any membrane whatever; and yet the caduca was intact, excepting at the part corresponding to the neck, where the traces of the laceration above described still remained. Furthermore, it was wholly impossible to detect the least solution of continuity elsewhere. How, indeed, shall we explain the constant integrity of the pouch formed by the caduca, if we admit that the ovule, before its expulsion, was entirely covered by the membrane?

The uterine caduca is about one line in thickness; it is soft, spongy, opaque, and of a reddish or yellowish-gray color. Its thickness is greater at the circumference of the placenta, around which, by doubling on itself to form the caduca reflexa, it constitutes a collar or fold in which the placenta seems to be set.

As regards its intimate structure, the caduca reflexa is precisely similar to the external membrane, only differing from the latter in being formed somewhat later, since it is a consequence of the ovule's arrival in the matrix. It is uniformly absent in the extra-uterine pregnancies, whilst the internal parietes of the womb are lined in such cases by the uterine caduca which preserves the simple ampullar form it originally had. Again, the reflected portion is not uniform in thickness at all periods of gestation; thus, at first, it is about the same as the parietal part; but the gradual distension produced by the growth of the ovum will evidently render it thinner and more transparent; so much so, indeed, that some authors suppose that it disappears altogether after the sixth month.

The external surface of the uterine caduca which adheres to the womb is very irregular, and is often studded with some very fine, delicate filaments; and, by examining it through a magnifying glass, a large number of minute foramina, described by Montgomery, may be seen, which are the orifices of the little venous canals that traverse the substance of the membrane obliquely. I have frequently traced out those canals, and have noticed that after their ramifications and anastomoses with each other, they terminate by another opening on the internal surface of the caduca. The inner face of this membrane is much more smooth, being covered by a species of epithelium, and exhibiting under the microscope some small mamillary elevations, which resemble somewhat in appearance the cerebral convolutions, and upon each of these processes several orifices of an oval form may be recognized. The epithelium apparently engages in the openings, and is then continuous throughout

the whole length of the venous canals, of which, indeed, these foramina are merely the terminations.

I once observed in a woman, in the second month of pregnancy, says Dr. Robert Lee, the uterine caduca still adherent throughout, to the internal surface of the organ, having all its veins distended with coagulated blood. By carefully separating the membrane the clots could be observed as continuous from the veins of the caduca into the uterine veins, and on tracing accurately these fibrinous lumps through its substance, I could readily assure myself of their sinuous course from the internal to the external surface of the caduca.

The reflected decidua is very thin, and is completely separated from the uterine caduca; it also seems to be perforated by foramina, which are particularly numerous near the border of the placenta towards the angle formed by the reflexion of the external membrane.

According to M. Serres, the villosities on the surface of the ovum engage in these orifices, so as to derive from the cavities of the caduca the primitive materials necessary to the support of foetal life. But whatever may be thought of this opinion, it is at least very certain that these foramina serve to open a communication between the cavity of the caduca and the space that separates the chorion from the reflected layer—a space occupied, as before stated, by the chorial villosities. Hence we may understand how the blood that escapes into this part, in certain cases of hemorrhage followed by abortion, may penetrate through the holes and get into the very interior of the caduca.

"I can now show you several ova," says Dr. Robert Lee, "in which coagula of the fibrin of the blood are seen filling these openings, and were hanging through them into the decidual cavity." The reflected caduca is likewise lined internally by a delicate layer, a sort of epithelium, continuous with the one described as existing in the uterine portion.

From the description here given, we can justly appreciate the value of the statements made by those authors who consider the caduca as being altogether deprived of vessels, and as absolutely inorganic; as also, how far M. Velpeau, who adopts this idea, has erred in giving this the name of the *Anhistous membrane*.*

* Perhaps it would not be a matter of impossibility to reconcile these two opinions, which are apparently so opposite to each other, for the caducous membrane is at once traversed by vessels, and yet is inorganic. In fact, by studying the mode of its formation, we may observe that the vessels traverse, but do not properly belong to it; they are mere prolongations of those coming from the womb, and probably do not even contribute to its nutrition; hence this hypothesis necessarily supposes that the caduca will only be developed in its uterine portion through a continuance of the primitive secretion. Perhaps a comparison will serve to illustrate my idea: suppose some fluid plaster is poured over a head well covered with hairs; of course, by penetrating to their roots, it will soon wash the whole, and when the plaster becomes dry, it will form a solid mass, in which the hair will be entangled, without forming a component part of it.

This mode of presenting the facts also furnishes the explanation of the reflected caduca, and even the divers characters it exhibits. Let us suppose,

On the contrary, the uterine caduca is filled with vessels, and it would be really difficult to find anywhere a more rich vascular plexus than that formed by the intercrossing and anastomosis of the veins which ramify in its substance; and which are evidently continuous with the uterine veins, or rather they are merely the prolongation of the vascular villi found on the mucous membrane, which have taken on, according to the observation of Baér, a considerable development.

This vascular richness is particularly evident in the earlier months of pregnancy; but somewhat later, when the function of the caduca is superseded by the growth of the placenta, its vessels become atrophied, and then it is quite difficult to demonstrate their existence. Similar oblique, sinuous, or serpentine canals have likewise been observed in the foetal or the reflected caduca, and M. Breschet has even traced the filaments coming from the chorion into the substance of the former membrane. But we assert that those canals are not vessels.

M. Breschet has particularly described a liquid found in the cavity of the caduca, which he has named the *hydropérione*. At first, this fluid is limpid and colorless, and mucoid or slightly albuminous in character; subsequently, it becomes a little milky, resembling, at times, an emulsion rubbed up with some mucilage, and is of a reddish-white color.

It is produced simultaneously with the primitive caducous membrane prior to the ovule's arrival, increases in quantity as the womb is developed, is afterwards found in the space between the uterine and the reflected caduca, and, indeed, continues to be secreted until these two come into contact with each other, that is, towards the fourth month. (*Breschet.*)

The opinion we hold as to the nature of the caducous membrane will be readily understood from the preceding account; namely, that it is a false lamina, analogous to those created on inflamed surfaces by the exudation and the coagulation of an albuminous liquid; and further, that it forms a layer entirely distinct from the mucous membrane, although adhering firmly to the latter by the intervention of the numerous vascular villi which penetrate it: and

for instance, that the doubling caused by the ovum took place at a time when the coagulation of the plastic lymph had actually commenced, but was not yet sufficiently advanced to give to the membrane the degree of consistence it afterwards acquires; under such circumstances, the uterine villosities will evidently be more firmly attached to the mucous membrane than to the soft tissue of the caduca, which is still in the progress of formation; and the ovum, by pushing the latter before it, will cause its detachment from the vessels that ramify in the substance thereof. Hence we can readily explain why the numerous vascular canals, that are so easily detected in the uterine, cannot be found in the reflected caduca; why it is perforated by foramina, which seem to indicate the points occupied by the uterine villosities before the ovule's arrival; and lastly, why it dwindles away in proportion as the ovum is developed, until it can scarcely be detected—because, being separated by the latter from the uterine wall, it can receive no further supply from the continued secretion, and the forcible extension it then undergoes can only take place at the expense of the previously acquired thickness.

we still consider this as the most plausible opinion of the present day, notwithstanding it has been vigorously attacked in the last few years by Weber, Sharpey, and Coste, who, by reviving a long forgotten theory, have endeavored to prove that what has heretofore been incorrectly considered as a distinct membrane, is nothing but the most internal layer of the uterus, all of whose elements, more especially the vascular apparatus, have undergone a considerable development, and whose consistence has greatly diminished.

I have carefully examined, with M. Coste, several of the preparations by which he sustains his views; but, unfortunately, the ovum, in all of them, had advanced to the third month at least; and it seems to me that this question can only be determined when an opportunity shall be afforded of examining an ovum of not more than five or six weeks, in the womb. My conviction, therefore, is far from being settled; but I am willing to confess, however, that the last uterus examined by us together has singularly shaken my belief on this point of ovo-logy; and this, conjoined with the descriptions given by Weber and Sharpey, restrains me from speaking any longer with the same degree of confidence as formerly.

It is, therefore, a subject which requires some further examination; and after having furnished the details, together with the opinion I think the most plausible, I ought to present succinctly the new theory.

According to Weber, the eaducous membrane is principally composed of the utricular glands found in the womb (*vide p. 92*), which are pressed against each other, and have numerous vessels running among them, that penetrate the internal face of the caduca, resembling small parallel filaments directed towards the surface. If a section of the uterus, covered by this membrane, be examined under a microscope in a good light, some long, thin, cylindrical glands may be detected, which are thicker at the point of union between the membrane and the viscus than elsewhere, commencing there by cul-de-sac beginnings that are very flexuous, and becoming somewhat contracted as they approach the surface. By compressing the pregnant uterus, a thick, whitish secretion can be squeezed out from these glands, which disseminates itself over the surface of the eaduca. This juice is eliminated through numerous small foramina that have long been known to exist on this surface, and at which two or more glands discharge. The latter are from two to three lines in length, and they occasionally divide into two branches of equal size.

Sharpey's description agrees perfectly with that of Weber, just given. The caduca is a line and a half in thickness, and may be easily recognized, as a mere enlargement of the mucous membrane, presenting on its surface numerous small rounded openings that belong to the utricular glands, which are dilated and prolonged from this membrane, as any one may prove by making a vertical incision. These glands interlace freely with each other in its substance, and their cul-de-sac extremities penetrate into the proper uterine tissue.

In one instance, where the pregnancy had probably commenced about two weeks previously, the internal surface of the womb exhi-

bited the same cibriform appearance, and the openings were slightly enlarged, and led to the dilated glandular canals; after a careful injection, the whole internal uterine surface, or the caduca in the course of formation, appeared to be covered with a network of sanguineous vessels, in which the glandular canals could readily be distinguished by their white color and their more advanced state of development. Besides, the veins had become converted into large trunks, which communicated directly with those of the womb. (*Bischoff.*)

The mode of formation of the reflected caduca is the strongest objection that can be urged against this theory, and I must acknowledge it is that alone which prevents me from adopting it. How, indeed, can we explain by this hypothesis: 1st. The clearly marked continuity of the reflected and the uterine caduca. 2d. Their identity during the earlier months of intra-uterine life, just at the period when they should exhibit the greatest difference. 3d. Why, on recently expelled ova at the sixth or the eighth week, does the caduca (since it forms a complete pouch without an appreciable trace of laceration), why, I repeat, does this membrane never surround more than a portion of the ovum, the other remaining completely free? And, lastly, why is it that this mucous membrane, whose adherence with the middle tunic should be the stronger, as we go back towards the period of conception, is expelled en masse, and without difficulty, when the abortion occurs at an early period, whilst we can scarcely find any shreds of it on ova of a more advanced age?

None of the writers who sustain the latter opinion have hitherto explained these difficulties in a satisfactory manner; nevertheless, their solution is indispensable before it can be unhesitatingly acknowledged, that the caduca and the uterine mucous membrane are one and the same thing.

The following, in my opinion, is the mode in which the two laminæ of the caduca would be formed; tracing out the primary phenomena, those immediately consecutive to the conception: 1st. There is the development or elongation of the uterine villosities (*Baër*). 2d. An exudation of coagulable lymph which bathes these villosities. 3d. The coagulation of this liquid, whereby a kind of jelly is formed, which is the first trace of the primitive caduca. 4th. The arrival of the ovule, pressing before it a part of this membrane, thus causing the formation of the reflected caduca, which is necessarily pierced by foramina, since the villosities that previously penetrated it still remain adherent to the internal uterine surface; the gelatinous pulp alone having been turned aside by the ovum. 5th, and lastly. The exudation somewhat later of a fresh quantity of plastic lymph, which aids in forming the placenta, and the decidua serotina, or inter-utero-placental caduca.

The caduca is an organ of protection, as also, very probably, of nutrition for the ovum.

Its use, says M. Breschet, is to close up every part of the uterine cavity, so as to prevent the products of generation from escaping. It receives and surrounds the ovule, and serves to fix the latter in

the centre of that large cavity, thus becoming an intermediary body destined to protect the little product against any pressure which the uterine walls may make upon it; and likewise to facilitate the communication that must exist between them, whether that be in transmitting the nutritive fluids, or in carrying off whatever may have already served for its growth.

The liquid contained within its cavity is very probably intended for the nourishment of the embryo during the early months of intra-uterine life; for at this period, the direct communications that are afterwards established by the placental circulation between the mother and her offspring, do not as yet exist.

The latter opinion is confirmed by the atrophy, and the almost total disappearance of the *caduca* as soon as the new organs have their functions established.

CHAPTER III.

MODIFICATIONS OF THE HUMAN OVUM.

(FROM THE DEVELOPMENT OF THE ALLANTOIS UNTIL THE END OF GESTATION.)

By the details already given, we have shown that the human ovum, after the allantois has been developed, consists of the embryo, the two vesicles which emanate from it, and the enveloping membranes, that are destined to protect it, and to establish with the mother the relations necessary to its existence. The modifications these different parts undergo from the early weeks of intra-uterine life down to the end of gestation still claim our attention; and we shall commence the description by examining the appendages of the fœtus.

ARTICLE I.

OF THE FÆTAL APPENDAGES.

These comprise the allantois, the umbilical vesicle, the amnios, and the chorion.

§ 1. OF THE ALLANTOID VESICLE.

The little pyriform vesicle we have denominated the *allantois*, is observed, about the tenth day, to spring from the inferior part of the intestinal canal, and taking on a rapid growth it soon becomes applied by its base to the internal face of the chorion. The terminal branches of the two umbilical arteries and vein, as previously stated, ramify on the walls of this vesicle; and hence the urachus, which is nothing else than the pedicle of the allantois, is accompanied in its course by three blood-vessels (*vide* Fig. 47), two of which

(*i i*) are arterial, coming from the iliacs, and called the *umbilical arteries*. They run to the chorion, where they ramify, and ultimately reach the villi that form the foetal placenta. The third trunk is venous, and is known as the *umbilical vein*.

The umbilical vein *j* leaves the right auricle of the heart at the point *j'*, and soon after receives the contents of the vena cava inferior *k*; it then traverses the under surface of the liver *m*, to which it sends a copious vascular supply, and, before passing this organ, receives the omphalo-mesenteric vein at the point *o*; then, after leaving the liver, it gains the left side of the abdomen between the walls of this cavity and the intestinal folds *E*; next, by turning abruptly towards the umbilical cord, it gets to the left side of the urachus, and accompanies the latter to the chorion, where it follows the umbilical arteries into the villosities.

After the earliest periods of development are over, there is but a single umbilical vein left, although, during the first part of the embryonic existence two are met with, one upon each side of the urachus (and consequently one for each umbilical artery). That on the right side becomes effaced, but its traces may still be found at the thirtieth or even the fortieth day; indeed, some such existed and were perceptible on the embryo I am now describing.

When the umbilical vein has actually passed the liver, it gives off no branches whatever in its course along the urachus, nor does it divide and subdivide until it reaches the chorion. But in the earlier periods of gestation, when the two exist, they are observed to spread over the walls of the chest and abdomen in the form of a large vascular plexus, extending as far as the vertebral column; however, this new apparatus soon disappears, leaving no vestige of its former existence.

The body of the allantoid vesicle goes away very rapidly, and scarcely a trace of it can possibly be found after the lapse of a few days from its first appearance. In fact, nothing more is seen than a cord of a variable length, extending from the embryo to the chorion, and having the umbilical vessels enclosed within it. This likewise becomes gradually atrophied in such a way as to disappear altogether in the substance of the umbilical cord; nevertheless, a portion of it still persists in the abdominal cavity of the embryo, forming there the cord subsequently known as the urachus; and just as this latter terminates in the rectal intestine, it exhibits a small swelling which is afterwards converted into the urinary bladder. We may remark, in anticipation, that this rudimentary bladder communicates with the rectum, and constitutes there that transitory cloaca, whose existence in the human species may be positively verified by direct observation. It is this early disappearance of the allantois which has induced some oologists to doubt its existence in the human race. It is exclusively destined to bring the embryonic vessels into contact with the external membrane of the ovum, whence they are soon placed in their proper relation with the internal face of the womb.

§ 2. OF THE UMBILICAL VESICLE.

This vesicle is solely formed by the internal or mucous layer of

the blastoderma; at first, it is very voluminous, occupying nearly the whole cavity of the ovum, and communicating so freely with the intestinal cavity as to form with it apparently but a single vesicle. But the gradual contraction of the ventral opening serves to separate the two, as we have already demonstrated, leaving only a pedicle of variable thickness, according to the size of this aperture.

The umbilical vesicle contains a yellowish-white liquid, in which numerous granules and some few globules are seen floating. In structure, it seems to be formed of two laminae, one being an external or vascular, and the other an internal or mucous layer. As the amnios becomes developed, the vesicle is repressed by this membrane, and is then found placed between the external face of the latter and the internal surface of the chorion.

In consequence of the allantois' development, the umbilical vesicle loses much of its importance in the human species, as it so soon becomes an organ of little value either to the growth of the ovum or the embryo: and furthermore, it dwindles away speedily; thus, during the first three weeks it is as large as an ordinary pea, but after the fourth, it begins to fade and diminish in size, and at six weeks subsequent to the conception, it does not exceed a coriander seed in bulk; then it remains stationary for a time, not disappearing altogether until towards the fourth month. I have observed it several times of latter years on ova of three to three and a half months, in which it generally still retained the volume and shape of a small lentil, being of a yellowish color, and having its surface wrinkled. However, I may remark, that its size appeared very variable in several ova of the same age.

In proportion as the umbilical vesicle becomes atrophied, it is removed further and further from the trunk of the embryo, in consequence of the development of the amnios, and its pedicle is also elongated in a marked manner; thus, the latter is from two to six lines in length, being continuous at one end with the intestine, and at the other with the vesicle by a kind of an infundibuliform expansion. The pedicle is apparently separated into two portions by the amnios, before the abdominal walls are completely closed up; one part lying between the spine, or rather the intestine, and the spot afterwards occupied by the umbilicus, while the other remains exterior to the abdomen. This pedicle is traversed by a small canal for the first five or six weeks of its existence, through which the fluid in the vesicle may be pressed back into the intestine, but it is obliterated after that period. About the same time, also, it becomes more and more delicate, and often ruptures from its great elongation; and its umbilical portion being lost in the cord, can no longer be traced into the abdomen. When broken, the vesicle may be found more or less removed from the root of the cord, and lying between the chorion and amnios.

The umbilical vesicle has a rich vascular apparatus, the blood of which is carried to and from the embryo by the intervention of two trunks, one venous, the other arterial; both, however, accompany the pedicle, and form a constituent part of it. The first, N (*vide*

Fig. 47), called the *omphalo-mesenteric vein*, enters the abdomen, winds around the duodenum and then opens into the umbilical vein at the point *o*, just as the latter is emerging from the liver. As it passes the duodenum, branches are given off to the stomach and intestines, and when it discharges into the umbilical vein, it sends a voluminous trunk to the liver. That portion which furnishes the branches just described, persists in the adult under the name of the *ventral, or hepatic-portal vein*, whilst all the rest will disappear with the umbilical vesicle and its pedicle.

The arterial trunk *P*, accompanying the pedicle, has been designated as the *omphalo-mesenteric artery*. Arising from the aorta, it gains the summit of the intestinal convolutions and gives off branches to the mesentery and to the intestine itself; then it reaches the pedicle, and follows the latter to the umbilical vesicle, upon which it ultimately ramifies. The part that supplies the mesentery is converted in the adult into a mesenteric artery, all the rest being effaced. From all which, it appears that the vascular system of the umbilical vesicle represents the primitive circulation in the embryo, corresponding in it to the sanguiferous apparatus of the yolk of fowls. Of course, these vessels will become atrophied with the organ to which they belong.

The use of the umbilical vesicle seems to be, that of containing the liquid which has to contribute, during the early weeks of intra-uterine life, to the nutrition of the foetus.

§ 3. OF THE AMNIOS.

The most internal membrane of the ovum, or the *amnios*, is formed by the inner lamina of the fold, or the cephalic and caudal hoods which constituted the external serous layer of the blastoderma around the embryo. Being continuous, as we have shown, with the margins of the ventral opening, it seems at first to be attached by its middle part to the skin on the dorsal region.

The internal amniotic surface subsequently exhales a liquid into its cavity, in which the embryo swims about freely; hence the amnios constitutes a little sac around the foetus, having smooth and transparent walls. Its inner surface is bathed by the liquid enclosed in this cavity, whilst its external one is separated from the chorion by a space of variable size, which space is likewise filled with a fluid.

Originally, this membrane was not concentric with the chorion; but in proportion as the development advances it presses back the exterior liquid more and more, thereby condensing it, and finally comes in contact with the external envelop of the ovum. Now, since it adheres to the periphery of the umbilical opening, it must furnish, by such an extension, a sort of membranous sheath to the pedicles of the allantoid and the umbilical vesicles, as well as to their accompanying vessels, surrounding them throughout their course from the umbilicus to the chorion; and all the parts thus enclosed constitute what is called the *umbilical cord*; whence it follows that the abdominal cavity itself must be in connection with the canal, represented by this cord, and consequently that the

fœtal appendages may communicate with it, through the route thus opened to them. It is, in fact, by this way that the pedicle of the umbilical vesicle becomes united to the ileo-cœcal fold of intestine, whilst the allantois connects with the rectum by the intervention of the urachus.

As we have just stated, the amnios is separated from the chorion during the earlier weeks by a space filled with fluid, which space is larger in proportion as the ovum is the more recent. This extra-amniotic liquid forms a gelatinous or albuminous mass, somewhat weblike in arrangement, and having the umbilical vesicle in its midst. The mass becomes more and more compact by pressure of the amnios, which has a constant tendency to approach the chorion, thus acquiring the aspect of a membrane (the *membrana media* of Bischoff), which is situated between the chorion and the amnios, where, says this author, it may be readily distinguished towards the end of pregnancy, as a gelatinous, though continuous membrane. Wagner, on the other hand, describes this mass as resembling the inter-muscular cellular tissue; and M. Velpeau has given it the name of the *vitriform* or *reticulated* body; but he is certainly wrong in considering it as analogous with the allantois.

The amnios undergoes no important change during the ulterior development of the ovum, nor does its texture. Of course, it would be more firm and consistent, acquiring by time a greater resemblance to the serous membranes, although it neither encloses nor possesses vessels at any period. Nevertheless, says Dugés, it probably has some openings, which permit the waters, exhaled by the uterine capillaries, and received by the vessels of the caduca and the chorial villosities to be diffused around the fœtus; but this perspiration of the liquids secreted by the internal uterine surface, may very possibly be a simple phenomenon of endosmosis.

§ 4. WATERS OF THE AMNIOS.

The amniotic cavity is filled with a liquid, in which the fœtus is plunged. At the commencement of pregnancy, this fluid is a little dense, more or less transparent and limpid, but towards term it becomes viscid, unctuous, and more consistent than pure water; sometimes it is as clear as serum; at others, is of a light-yellow or greenish color. It frequently becomes lactescient, disturbed, and interspersed with yellowish-gray, or even black albuminous flakes; again, in certain cases, it is strongly tinged with yellow, when the membranes are ruptured, from the admixture of a quantity of meconium; it exhales a disagreeable odor, analogous to that of the spermatic fluid, and its taste is slightly saline.

These waters are exceedingly variable as regards quantity: thus, for instance, in the early months, it is the more considerable in relation to the fœtus as the embryo is younger; but the two have very nearly the same weight at the middle term of gestation. Again, dating from this period, the difference is generally in favor of the fœtus, and the weight of the latter at term is four or five times greater than the waters, which seldom exceed a pound or a pound

and a quarter; consequently, if the assertion is true, that the waters augment in their absolute quantity until term, it is equally so to say they increase relatively to the foetus in the first, and diminish in the second half of pregnancy. In fact, the variations on this head are infinite, even at the time of the accouchement.

According to the analysis of Vauquelin 100 parts of amniotic liquor consist: of water, 98.8; of albumen, hydrochlorate of soda, phosphate of lime, and lime, 1.2. The interesting question now arises—What is the source of the amniotic fluid? Some assert it comes from the mother; others, that it is produced by the foetus. Chaussier, Meckel, and Beclard, adopting an intermediate opinion, suppose that its secretion takes place at once from the female and her product.

Everything proves, says M. Velpeau, that the liquor amnii is the result of a transudation or of a simple exhalation, like the serum of the pleura, pericardium, &c., and that the perspiration requires no particular canals for its accomplishment, being a phenomenon of pure vital imbibition.

Agreeably to Burdach, the amniotic waters cannot be secreted by the foetus, because they exist prior to its formation,* and therefore they must be exclusively furnished by the internal uterine surface, and will reach the cavity of the amnios by traversing its walls. We also believe that the greater part of this liquid comes from the mother's organs; yet we must add that certain products, secreted by the foetus, are generally met with there; for instance, it is frequently colored by some meconium, and besides, it is almost certain that the urine may be discharged into the amniotic cavity during the latter months of pregnancy. A few incontestable facts prove, indeed, that such an evacuation is necessary to the maintenance of foetal life: thus, Billard and T. W. King record having seen cases of ruptured bladder, which had been produced by an imperforation of the urethra; and further, Desormeaux and P. Dubois, have observed an obliteration of this canal in two stillborn children, which had given rise to an enormous distension of the bladder, the ureters and both kidneys; indeed, the latter were found transformed into two multilocular cysts.

According to some authors, the principal use of these waters is to contribute to the nutrition of the foetus, at least, for a very great part of gestation. (*Vide Nutrition of the Fœtus.*) However this may be, the waters of the amnios serve during pregnancy to maintain the insulation of the external foetal parts before the skin becomes covered with the sebaceous coat hereafter to be described; to promote the active movements of the foetus and its development, both of which would have been greatly incommoded without this intervention, by the pressure of the uterine walls; to protect the foetus from all external violence, and to afford it facilities of conforming to the laws of gravity. They likewise favor a uniform

* It is only necessary to recall our remarks on the development of the amnios to refute this opinion.

expansion of the womb, and remove all pressure from the umbilical cord, thus assuring the integrity of the foeto-placental circulation both in pregnancy and during labour. In the latter, they seem destined to guard the child from the violence of the uterine contractions, which, without them, would certainly compromise its existence; to aid in forming the amniotic bag, the engagement of which renders the dilatation of the neck more uniform and easy; to lubricate the pelvic canal, and thus facilitate the descent of the foetus; and lastly, they render manipulations of every kind less difficult than they otherwise would be.

§ 5. OF THE CHORION.

The chorion is the most external envelop of the ovum, though with regard to the elements that enter into its composition writers are by no means unanimous; thus, some of them, as we have had occasion to state, suppose that it is formed by the vitelline membrane, the external lamina of the blastoderm, and the allantoid vesicle, uniting to constitute a single layer. According to others, on the contrary, the vitelline membrane will disappear soon after the doubling up of the blastodermic vesicle, and the external lamina of the latter, conjoined with the allantois, will then form the chorion. As to ourselves, the reasons have hitherto been given that induce us to adopt the former opinion.

But be that as it may, the chorion certainly does not exhibit the same aspect at the advanced stages of pregnancy; for during early embryonic existence the external membrane of the ovum is thin, transparent, and perfectly smooth on its outer surface, whilst about the second week this surface presents some minute granular elevations, which increase in length very rapidly, and the chorion soon becomes studded with numerous villi. But at that time neither the chorion nor the villi have a proper vascular apparatus, since it is not until after the allantois, together with the umbilical vessels, has become applied to the chorion, that any vessels can be detected going from this membrane, either to penetrate into the villi, or only, perhaps, into the space between them (*vide page 169*).

The chorion is enveloped, in a great measure, by the caducous membrane, and hence only comes into relation with the uterine wall, at a restricted point, or rather with what is styled the secondary caduca; those villi which are in contact with the reflected caduca penetrate, in augmenting, at first, into the substance of that membrane; there even exists (agreeably to the observations of M. Jacquemier) a considerable space between the chorion and caduca, occupied by these villi; but the latter soon become atrophied, and dwindle away almost completely, the interval disappears, and the two membranes come into immediate contact.

As regards the chorial villosities not covered by the reflected caduca, so far from being atrophied, they speedily undergo a considerable development, plunge into the albuminous matter that forms the secondary caduca, and, intercrossing with the numerous vessels developed in its substance, contribute to the formation of that essen-

tially vascular mass we are about to describe under the name of *placenta*.

The chorion is in apposition by its internal face with the amnios at an advanced period of pregnancy; but, as previously noticed, these two membranes are not concentric in the earlier months, being then separated by a considerable space, that is occupied by the umbilical vesicle and an albuminous liquid, which is the more abundant and limpid as the gestation is less advanced.

After the development of the placenta, the chorion is a thin, transparent, colorless membrane, united outwardly to the caduca by some short, delicate filaments, the remnants of the atrophied villi, and inwardly to the amnios by an albuminous layer (*tunica media*). The part corresponding to the placenta is not in contact with the caducous membrane, it is thicker and adherent to the foetal surface of that vascular body, and the attachment is more intimate near the roots of the cord. After what has already been stated, it were idle to discuss the vascularity of the chorion, for it evidently has no vessels until after the allantois has been developed; but from that period it consists of two laminæ, the external or primitive of which, also called the *exochorion*, is wholly deprived of vessels, whilst the internal or allantoid is essentially vascular, and it has been denominated the *endochorion*.

ARTICLE II.

OF THE ORGANS OF CONNECTION.

§ 1. THE PLACENTA. (AFTER-BIRTH, *secundines*.)

The placenta is a soft, spongy mass, constituting the principal connection between the ovum and uterus, being destined to the hematosis, and perhaps also to the nourishment of the foetus.

It is a flattened body, about three-quarters of an inch in thickness at the centre; but tapering off towards the circumference, which does not often exceed two or three lines; in some cases it is very thin, but then is very large, and further, its figure and dimensions are exceedingly variable; thus, the ordinary diameter of the placenta varies from six to eight and a half inches, at times one diameter is longer than the others, and the shape, therefore, is circular, oval, &c., according to circumstances. The term *placenta en raquette* (battledoor-placenta), has been applied to that variety in which the cord is inserted on the border. As a general rule, only one placenta exists in simple pregnancies. However, a very curious exception has been observed quite recently at the clinique of the Berlin Hospital, namely, a double placenta for a single child. Dr. Ebert furnishes the following description of this anomaly: when displayed on a table, it was found to be divided into two exactly equal rounded parts, which were entirely distinct, having no connection whatever with each other, excepting through the intervention of the cord and membranes; an interval of about three inches separated the two

portions. The cord was twenty-one inches long, containing, as in the normal state, the three vessels spirally arranged, but this spiral form ceased nearly two inches from the bifurcation of the umbilical vein; at this point the two arteries were placed, one on each side of the vein, and only communicated together by a trifling anastomosis.

The vein bifurcated about four inches from the placenta; the two resulting branches were of unequal length, and the longest sent a branch to the opposite placenta. The arteries had a similar arrangement, being separately distributed, one to each after-birth. The one corresponding with the longest vein likewise sent a branch to the other placenta, but the interior subdivisions of the vessels offered no further anomaly.

The membranes formed a single cavity for the foetus and amniotic waters; they invested the two portions of the cord, the foetal face of both placentas, and passed from one organ to the other, thus establishing a kind of membranous bridge between them, which, with the cord, was the sole point of communication between these two masses. (*Arch. Gén.*, 1842, t. xiv.)

A similar case has recently occurred at the *Clinique d'accouplement de Paris*, a drawing of which has been prepared by M. P. Dubois.

The after-birth presents for our study a *foetal*, or *internal* face, an *external*, or *uterine* surface, and a circumference, or border. The internal face is covered both by the chorion and amnios, and it ex-

Fig. 41.



The internal, or foetal surface of the placenta.

Fig. 42.



The external, or uterine surface of the placenta.

hibits numerous ramifications of the umbilical arteries and vein, which generally converge about the centre of this body to form the umbilical cord. The uterine surface is much less smooth, polished, and uniform than the preceding, and is slightly convex, whilst the former is a little concave. It is subdivided into a variable number of lobes, or irregularly rounded cotyledons, held together by a soft, lamellated, albuminous tissue, which is so easily lacerated, that a rupture may occur during the separation of the placenta, so that after its expulsion the cotyledons appear to be separated from each

other by furrows or deep fissures. This surface is not in immediate contact with the uterus, but is removed from that organ by the inter-utero-placental caduca, and certain vessels that we shall presently indicate. The placental circumference is thin and irregular, and its extent, although very variable, is generally about twenty-five inches. The margin according to M. Velpeau, is continuous without a well-marked line of demarcation with the double lamina formed by the folding of the caducous membrane. But agreeably to other anatomists (and this opinion seems more concordant with the views of M. Velpeau himself, on the development of the caduca and placenta), the periphery of this vascular mass is continuous with the chorion, and only *contiguous* to the double fold of the caduca, which is there thicker and more dense, and presents a kind of a triangular sinus for the reception of the placental border.

Structure.—This organ is essentially vascular; the vessels composing it are held together by a weak tissue, analogous, say some authors, to the cellular tissue, but which, according to Velpeau, is simply a lamellated substance altogether different from the former. The vessels entering into the placental formation are dependencies of the vascular systems, both of the mother and the child.

The structure of the after-birth has been a theme of numerous discussions among embryologists; but the researches of MM. Blandin, Jacquemier, Flourens, and Bonami, in our own times, and even yet more recently those of Reid, Weber, Coste, and Eschricht, have thrown much light on this subject. We have had the good fortune to examine for ourselves the injected preparations of M. Bonami, and the following are the results he has arrived at, as well as some of those furnished by M. Jacquemier, which we shall first describe: thus if, while the placenta is still adherent to the uterine wall, a careful effort to detach it be made, we can easily see that this detachment takes place at the expense of a particular tissue, which at once separates and holds the two surfaces in contact. Now, this utero-placental substance is of an albuminous, or rather of a laminated character, consisting of numerous lamellæ which interlace in all directions, and adhere to each other at certain points only of their surface; and, as a necessary consequence of such an interlacement, this tissue presents multitudes of cells or areola, which become more apparent by making a slight traction on the placenta and uterus, or by introducing a current of air under the contiguous parts. This membranous layer (that has also been accurately described by M. Jacquemier) is moulded, as it were, on the irregular surface of the placenta to which the adhesion is more perfect than to the corresponding part of the womb; it dips into the fissures that separate the cotyledons, unless these should happen to be very deep, when it merely passes from one lobe to another, thereby forming a species of membranous bridge; but a cellulo-mucous partition much thicker than the preceding penetrates deeply between the lobes. At term, this membrane is very thin; a delicate, soft, gelatinous layer remaining adherent to the corresponding portion of the uterus. The lamina clothing the external surface of the placenta, is continuous with the

caducous membrane without exhibiting any other difference, says the same author, than a considerable augmentation of thickness; a disposition that is apparently mechanical, being due to the relief made by the projecting circumference of the after-birth, and which thus determines around that organ a greater accumulation of plastic material. According to that able anatomist, this membrane offers all the physical characters of the caduca, and he seems quite disposed to consider them both as being one and the same.

On the contrary, M. Velpeau teaches (and this seems to me the most plausible opinion) that the lamellæ, composing the inter-utero-placental tissue—are the products of an excretion from the womb and chorion together with its downy fasciculi, having in this respect some analogy to the caducous membrane, but differing from the latter in not becoming evident until long after the arrival of the ovum in the uterus, and in being exceedingly fragile and breaking with the greatest facility, while the other possesses considerable suppleness and elasticity.

The term uterine, or maternal placenta has been improperly applied to this membranous layer; for although such exists in some species of animals, yet it is impossible to distinguish any trace thereto in the human race. This inter-utero-placental tissue is traversed by a great number of venous and arterial vessels, which pass from the internal surface of the uterus to the placenta (utero-placental vessels); but it does not appear to be the ultimate termination of a single sanguineous trunk, since the cells it forms do not communicate, as has been stated, with the uterine veins. No trace of the injection remained in the preparations just alluded to, made by M. Bonami.

Let us proceed, however, to the vascular structure of the placenta, properly so called; and, as I have witnessed the injections of M. Bonami, I cannot do better than transcribe here the following parts of his thesis: "A first injection of the uterine venous system was made through the primitive iliac, and one of the ovarian veins, composed of spirit varnish, colored with red lead. A second, consisting of spirits of turpentine and indigo, was then made of the uterine arteries through the inferior extremity of the aorta, ligatures being previously placed on all vessels capable of transmitting the injected fluids to the inferior extremities.

The uterine cavity having been opened at some distance from the placental insertion, and the foetus stripped of its membranes, a blackish liquid, which was nothing but the blood, was next squeezed from the vessels of the cord; then injections were thrown into the umbilical vein, and into one of the arterics, having linseed oil as their base, colored with white lead, and yellow ochre.

These injections were made with the greatest possible prudence, and the following results were afterwards obtained from a careful dissection. "At first, the red liquid injected into the uterine veins, could be distinctly perceived on the foetal surface of the placenta. But, by what canals could the injection have penetrated so far as this? Here was a new subject of research; but, by carefully turn-

ing the placenta aside, a considerable number of small vessels could easily be recognized, leaving the internal face of the womb, traversing the inter-utero-placental tissue just described, and plunging into the substance of the placenta. These consisted of arteries and veins readily cognizable as such, by the different colored injections."

1st. *Arteries*.—The number of these is large, and they are more abundant near the centre of insertion, than anywhere else; still, a few very delicate ones are found about an inch from the placental periphery. As a general thing, their volume is quite small, varying from a fourth of a line to a line in diameter. They assume very sensibly a spiral arrangement, and their course is oblique, most always creeping along for a third of an inch, sometimes more, before their terminal extremities are directed towards the anfractuosities of the placenta, and they evidently penetrate the proper substance of the latter, though towards the uterus they are clearly continuous with the uterine arteries. Lastly, they have but few ramifications, and these rarely anastomose with each other.

2d. The *veins* pass from the uterus, through the inter-utero-placental membrane, towards the placenta, but they have not the same disposition as the arteries.

The calibre of these veins, says M. Bonami, is nearly equal to that of the arteries, sometimes even a little larger, some of them being from two to three lines in diameter. The characters by which we could distinguish these from the arteries, were of the last importance in the piece under examination. Thus, these veins were penetrated by liquids thrown into the uterine venous system; they were rectilinear, and their exceedingly numerous ramifications anastomosed freely with each other, thereby forming vast plexuses, on the cell walls, which penetrated the uterine surface of the placenta at all points—and, on the other hand, by further dissection, could be seen with the naked eye terminating in the large uterine veins. Besides these, according to Meckel and Jacquemier, there exists a vein on the periphery of the placenta, in the form of a crown; but this coronary vein is rarely complete, as it nearly always exhibits one or more interruptions of an inch or two each, although its continuity is sustained by a series of veins anastomosing with one another, and its course exhibits numerous dilatations, as if it were varicose. It communicates, at short distances, with the uterine veins, and receives contributions both internally and externally—the one spreading over the uterine surface of the placenta, and anastomosing with the veins that penetrate this body at its centre; the others, which are less numerous, ramifying in the substance of the caduca, two or three inches from the circumference of the placenta, and communicating by their outer extremities with the uterine sinusses, that are situated about two inches from the same point (the placental periphery); but the presence of this coronary vein is not constant, for neither Velpeau nor Bonami have ever met with it.

There are, therefore, certain arteries and veins that penetrate the placenta, belonging to the maternal vascular system, though, before studying their distribution, let us examine the umbilical vessels.

These, consisting of the umbilical arteries and vein, having arrived at the foetal surface of the placenta, divide into several large branches that are found between the amnios and chorion. The first of these membranes may be detached from them with great facility; but the second intimately adheres to the vessels, which it completely envelops, thus forming a sheath in which one artery and one vein are always found, the vein being much the larger; shortly after, each trunk divides into two branches, each of these into two others, and thus they go on subdividing dichotomously almost *ad infinitum*. The two umbilical arteries communicate freely with each other in the substance of the same cotyledon, and this anastomosis may even be seen without the aid of an injection. Again, if a coarse injection be thrown into one of the arteries, it will shortly return by the other; though, if the pressure be continued, it will pass from the arteries into the umbilical vein; but, if we commence by filling the vein, the injection reaches the arteries with more difficulty. If a very penetrating mixture be used, the whole uterine surface of the placenta will be converted into a very delicate plexus, which never affords an outlet to the injected liquid; *patulous orifices do not exist, therefore, at the extremities of the vessels.*

When a placenta has been thus injected, and is then macerated, it soon appears to resolve itself into a substance resembling woolly flakes covered by numerous particles of a soft pulpy tissue, that is detached from them with much difficulty. These flakes present under the microscope quite a number of granulations, composed of small, convoluted, twisted vessels, like those in the chorial villi of the cow or the sheep, and these small granules have been described as *acini*, or little grains. The vessels become longer as the maceration is continued, but they no further preserve more than an apparent flexuosity.

On the whole, therefore, the placenta is formed by vessels belonging to the mother as well as by those appertaining to the child, and each of its cotyledons is constituted in the following manner: the maternal, or utero-placental vessels penetrate at all points of its uterine surface, forming in its substance a network of exceedingly delicate meshes, while the umbilical vessels that penetrate on the foetal face offer those infinite ramifications just described, and these convolute and embrace the contracted meshes of the maternal plexus in all directions. Further, the connection existing between these two orders of vessels appears to result from the membranous sheath that envelops them both as far as the placenta.

This sheath is furnished to one set by the chorion, to the other by the lamellar prolongations of the inter-utero-placental tissue. In other words, being compressed and united with each other through the intervention of a common substance, these divisions and subdivisions form a cotyledon of the placenta.

Again, all the minute vascular ramuscles are so intimately connected that it is impossible to separate the vessels belonging to the mother from those peculiar to the foetus, and they can only be distinguished from each other by the different colored injections. But

although the two series thus interlace, the maternal branches never communicate by their terminal extremities with those of the foetus; since the finest injections, when most carefully made, have never established a direct communication between these two orders of vessels (unless by rupture of the walls).

The description of Eschricht is very analogous to that of M. Bonami; thus, the former concludes that two orders of capillary plexuses are in contact in the human placenta, and that the uterine arteries are continuous with the veins of the same name through a capillary plexus, equally delicate as the one existing between the umbilical arteries and veins.

But the researches of Weber have led to different conclusions as to the mode in which the uterine arteries run into the veins of a similar name in the placenta, and these curious results deserve some notice.

He states that the uterine arteries enter the after-birth without giving off any arborescent ramifications; and, on the other hand, that the veins do not arise by delicate ramuscles, but present at their very origin large trunks, which, by anastomosing with each other very frequently and at all points, seem to form in this manner a system of cells, whence the blood then passes by some venous trunks into the uterine veins. These latter continue with the arterial tubes from their origin; their walls are excessively thin in the placenta, being there reduced to the internal coat, and sinking in so much as to be nearly invisible when they contain but little blood. The terminal ramifications of the umbilical vessels project into these venous sinuses; moreover, the thin tunic of the vein is pushed into the interior of the vessel by the foetal villosity resting against its outer surface, and it thus furnishes a sheath to the villus, which seems to penetrate to the interior even of the maternal vascular tube, but in reality it does not.

Read, in August, 1840, easily verified, he says, the existence of the utero-placental vessels, when examining the uterus of a pregnant woman, who died at the seventh month:

After having detached a portion of the placenta under water, my attention was drawn to a number of rounded bands passing between the uterus and the external surface of the placenta, when the least traction was made. Their walls became thinner as their length increased, and had a cellular appearance, though they were easily lacerated; whilst sometimes, though more rarely, they seemed to separate like the tufts of the uterine sinuses. By cutting into one of the sinuses, these tufts could be traced, and could be seen ramifying in their interior; some seemed to penetrate the patulous opening of the sinus only, while others sank in for about an inch and appeared to penetrate the surrounding sinus. I could easily satisfy myself by injection, and microscopical inspection, that these tufts were the ultimate ramifications of the umbilical vessels.

It is scarcely necessary to add that these tufts only penetrated the openings of the sinuses situated near the internal surface of the uterus, and not those more deeply seated. Their volume varies

very much, some appearing to fill the sinous opening entirely, whilst others only occupy it in part. Again, although the tufts appeared loose, and floating in the interior of the maternal vascular tube, yet they were evidently surrounded by the internal tunic of the latter, which was reflected on their external surface.

I have assured myself that some of the utero-placental veins contained no prolongation of the foetal vessels, but in many others the villous tufts (the terminations of the umbilical vessels) could be recognized and followed into the uterine sinuses.

In tracing these utero-placental veins that contain no foetal vessels—through the caduca to the surface of the placenta—the internal membrane of such veins is found prolonged on the neighboring placental tufts; and further, by following a large utero-placental artery through the caduca, we may see that as soon as it arrives on the face of the placenta, its internal tunic is prolonged on certain tufts that are found plunged in its orifice.

The numerous branches of the foetal tufts which stop at the placental surface of the caduca, and neither penetrate into the uterine sinuses, nor yet into the orifices of the utero-placental vessels, are fixed by their extremities to the placental surface of this membrane. Consequently, the placenta is formed interiorly by numerous trunks and branches (each containing an artery and a vein), and each of these branches (both venous and arterial) is surrounded by a prolongation of the internal tunic belonging to the maternal vascular system, or at least by a membrane continuous with that tunic. Hence, in adopting such ideas on the placental structure, it becomes evident that the internal tunic of the mother's vessels is prolonged on each placental tuft, in such a manner that the maternal blood, arriving by the utero-placental vessels, passes into a large sac formed from the internal lamina of these vessels, and the blood is thus divided in a thousand different directions by the placental villi, which project like fringes into these vessels, pressing in the thin, soft parietes before them, and forming sheaths therefrom which completely envelop each trunk and each branch; the blood returns from this sac by the utero-placental veins without any extravasation or abandonment of the vascular system to which it properly belongs. And, therefore, the foetal blood, and that of the mother, can have no action upon each other, excepting through the spongy parietes of the foetal vessels and the thin sac that surrounds them.

But whatever opinion may be adopted as to the manner of vascular connection, it results, at least, from what we have just stated, that no direct communication exists between the maternal and the foetal circulations, and that there is nothing more than a mere contact of the utero-placental vascular tube and the umbilical ramifications maintained for a long time in the interior of the placenta; and we shall have occasion hereafter to deduce the physiological consequences which result from this important fact. Neither lymphatic vessels nor nerves appear to exist in the placenta.

We have stated that all the cotyledons which constitute the placental mass are united by an inter-lobular membrane; sometimes,

however, one or more of these lobes separate from the others, become isolated, and seem to form a special placenta, often giving rise to the supposition that several of them exist for a single fetus; and, perhaps, we may in this way explain the two cases cited at the beginning of this article, where two were found for a single child.

Development of the Placenta.—In the commencement of pregnancy this organ does not exist, for its earliest rudiments are only observed towards the end of the first month. According to M. Velpeau, however, the development begins as soon as the ovule reaches the womb, and he thus describes the sequelæ: after having glided between the internal face of the womb and the caduca, the ovule is in contact by one surface with the former, and by the other depresses this latter membrane. From that moment, a disc of the ovule is merely separated from the living surfaces by a laminated substance, and at that point the placenta is developed.

However this may be, distinct vascular granulations are observed

Fig. 43.

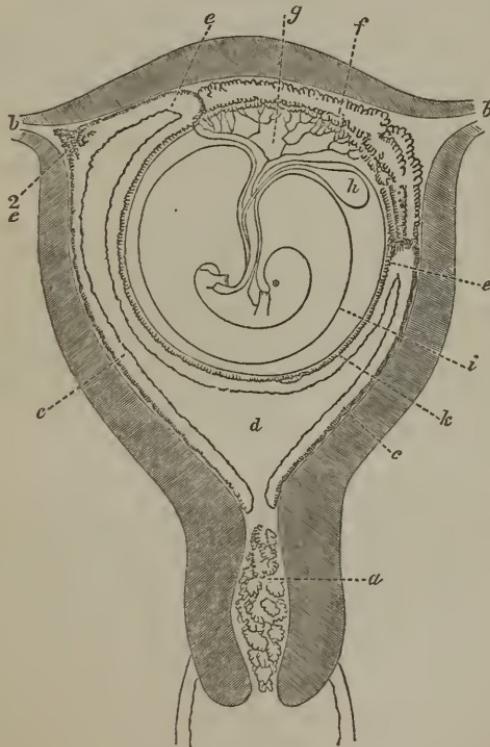


Diagram of human ovum at the time of formation of the placenta. *a.* Muco-gelatinous substance blocking up os uteri. *b b.* Fallopian tubes. *c c.* Decidua vera, prolonged at *c 2* into Fallopian tube. *d.* Cavity of the uterus, almost completely occupied by ovum. *e e.* Angles at which decidua vera is reflected. *f.* Decidua serotina. *g.* Allantois. *h.* Umbilical vesicle. *i.* Amnios. *k.* Chorion, lined with outer fold of serous tunic.

on some part of the ovule, generally on that in contact with the uterine wall, which seem to arise from the product of conception,

either by simple or double ramifications. The veins, according to some writers, appear first, but it is highly probable the arteries are developed at the same time. These rudimentary vessels successively grow, become elongated, and their ramifications more tufted and less distinct; and, on the other hand, the process of vascularization probably takes place in the inter-utero-placental tissue also. Some vessels starting from the internal face of the uterus run towards the chorion, and go to the point of union between the extremities of the umbilical arteries and vein. These are the utero-placental arteries and veins, which, after having penetrated the placental substance, ramify *ad infinitum*, interlacing with the umbilical rami. And all these ramifications being held together by an albuminous tissue constitute the placenta.

Agreeably to M. Velpeau, its dimensions relatively to the ovum are about the same at all stages of pregnancy, but I believe, with most other writers, that it is much more considerable during the first three months than at the end of gestation.

The placenta may be attached at any part of the uterine cavity, and even over its orifice; but most frequently this connection occurs about the fundus uteri. These varieties in its seat have been explained by saying that the after-birth is inserted over the most vascular part of the organ; but authors forget, that if the point of attachment be in fact the most vascular portion of the uterine walls, it is only because the placenta is inserted there, thus confounding the cause with the effect.

Certain others declare this point is determined by the specific weight of the ovule; but then it should be more frequently found over the cervix than elsewhere, which is contrary to observation.

Lastly, according to Moreau and Velpeau, the ovule arriving in the womb, would be constrained to detach the caducous membrane, and would naturally go toward those parts that offered the least resistance; that is, where the adhesions between the external face of the caduca and the uterine wall are weakest.

§ 2. THE UMBILICAL CORD.

The umbilical cord is the flexible trunk, which unites the abdomen of the child to the placenta; it does not exist during the early weeks of pregnancy, and its formation only commences when the embryo is completely separated from the blastodermic vesicle (which thereby becomes the umbilical vesicle); when the allantois, by being confounded with the external lamina of the blastoderm, no longer constitutes a distinct vesicle, but is merely a simple cord upon which the two umbilical arteries and the vein ramify; and when all these parts have received an enveloping sheath from the amnios. Now it scarcely appears thus formed until towards the end of the first month, being composed at this period, in all *normal embryos*, of three distinct parts: 1, of an enveloping canal, whose walls are formed by a reflexion of the amnios, and which is continuous with the umbilicus, or skin of the embryo; 2, of two pedicles (proceeding from the fetal appendages), around which this amniotic canal forms a

sheath, and which communicate, the one under the name of the *pedicle of the umbilical vesicle*, with the ileo-cœcal fold of intestine, and the other, under that of *urachus*, or the *pedicle of the allantois*, with the rectum.

But soon after, as the development progresses, and the pedicle of the umbilical vesicle is absorbed, the cord becomes simplified, and is reduced to the amniotic sheath and the urachus, accompanied by the umbilical vessels, with which this sheath is confounded by the obliteration of the canal that constitutes it. The effacement of this canal, along which only the urachus and its accompanying vessels pass, progresses from the chorial extremity of the cord towards the umbilicus, or the child's abdomen, and, as the progressive obliteration approaches the latter, it encounters the gut which advances beyond the umbilicus, and produces a hernia in the cord itself; but this rupture is naturally reduced from the pressure exercised on the intestine by the progress of effacement, which ultimately reaches the navel, and presses back into the abdomen everything met with outside of its cavity. However, there are some instances where this process is not completed in so efficacious a manner, and the intestine in such cases remaining beyond the umbilicus, produces the vice of conformation known as *congenital hernia*; a hernia that is nothing more than the persistence of an anatomical disposition, which always transitorily exists at a determined period of the embryonic life.

The cord, at the end of the first month, is still thin, cylindrical, and very small; but from the fourth to the eighth and even the ninth week, it acquires a considerable proportional volume; and it exhibits either some enlargements, some vesicles, or swellings, two, three, or four in number, which are separated from each other by a corresponding number of bands, or contractions.

During the third month it diminishes in size, in consequence of a retraction of these tuberosities; but again, commencing from this latter period, it continues to grow proportionally to the other parts of the foetus until the end of gestation. The cord varies greatly in length at term; generally, it is from twenty-one to twenty-three inches; some have been observed, however, from six inches to five feet (one metre fifty-three centimetres); others, still more rare, have reached five feet nine inches in length (one metre, seventy-five centimetres). I delivered a woman with the forceps, June 23d, 1841, in whom the head had been retained above the superior strait, and where the cord was only nine inches long. These extremes are very rare; nevertheless, they are not the utmost varieties the cord may offer in its extreme limits, for it has been known not to exceed five inches, and has even been as low as two inches.

In a case reported by Mende, it was so short that the placenta absolutely seemed fixed to the child's abdomen. Its size likewise varies in different subjects, being generally about that of the little finger, sometimes much smaller, and at others very large; but in all these cases its volume depends much less on that of the vessels than on the quantity of fluids accumulated in the surrounding tissue.

The nerves and lymphatic vessels, which certain authors have described as belonging to the cord are still a subject of research, admitted by some and rejected by others; their existence is at least problematical.

The arteries are two in number, and (following the course of the blood) they arise from the bifurcation of the abdominal aorta in the foetus, and reach the umbilicus where they part and course along the cord, describing numerous flexuositieas as far as the placenta, in the tissue of which we have already followed their ramifications.

The vein (always following the route of the blood) arises from the numerous rami muscles studied in the placenta; the venous radicles of each lobe unite in branches, which, in their turn, aggregate on the foetal surface of the after-birth to form there the trunk of the umbilical vein; and the latter, having arrived at the umbilical ring, abandons the two arteries, and runs towards the liver. (*Vide Circulation of the foetus.*) The vein is nearly equal in size to the two arteries united; but it is much less flexuous, and consequently its course is shorter.

These vessels are wound upon each other in a way nearly similar to the twigs of osier forming the handle of a basket; they give off no branches in the cord, and it has been remarked that the twisting of the vessels, which only begins at the commencement of the second month, takes place, nine times in ten, from left to right; the vein usually occupies the axis of the cord, and the arteries wind uniformly around it; of course, this enrolling must depend somewhat on the torsions of the embryo itself, and then the entire cord, together with its sheath is involved, as not unfrequently happens; but when the cord is straight, and the arteries are twisted at least more than it is, these contortions seem to result from a more rapid growth of the vessels within the sheath, than of the sheath itself (Haller). Now, the embryo and placenta being immovable, the turns starting from these two points will necessarily meet each other, and this indeed frequently takes place. Two, and even three umbilical veins have been met with in some cases; in others, instead of two arteries there is but one. Osiander once found three of the latter; it is worthy of remark, that neither the arteries nor the veins have valves at any part of their course.

These vessels are surrounded by a gelatinous substance called *Warthon's gelatine*, which is variable in its quantity, thereby giving rise to the division made by accoucheurs into the thin and fat cords. This substance is continuous on one part with the sub-peritoneal cellular tissue of the foetus, and, on the other, accompanies the vessels into the placenta; being spongy in character, it is constituted by a clear, tenacious liquid contained in the cellular areolæ that so freely communicate with each other. The cord frequently has one or more knots when it is very long, some of which are formed during pregnancy, and often even at an early stage; but others are only produced at the period of labour; they never become so tightened in gestation as to compromise the life of the child, to whose movements they are certainly due; but we can understand that the

cord may become tightly drawn during labour from being shortened by the existence of circular turns around the trunk, or neck; and the knots, in such cases, may be so hardened as to intercept the circulation completely, and the death of the foetus will necessarily result if the labour be prolonged. In one case, figured in the work of M. Baudelocque, the cord was knotted three times at the same place, and was interlaced like a mat.* Besides these knots, true nodosities likewise exist at times in the cord, produced either by the duplication or the varicose state of one of its vessels.

We have already stated that the cord is attached by one extremity to the umbilicus of the child, and by the other to some point of the placenta's foetal surface; but this, however, is not always the case, for facts too numerous prove that the cord may indeed be inserted on the head, neck, shoulders, and other parts of the foetal trunk, not to admit some of them, at least; such, for example, as the one observed by M. Jules Cloquet, at Brussels. The placental extremity of the cord also presents some anomalies; it is usually fixed very near the centre, but sometimes is found attached to a part of the periphery, bearing then the title of *the battledoor-placenta*. Nor is it always attached to a point of the placenta's foetal surface. For instance, Benckiser has collected in his thesis numerous cases in which the cord was inserted at some point on the periphery of the membranes; and having arrived there, the vessels of the cord then divide into five or six large trunks, the branches of which, by ramifying between the membranes, reach the placental circumference, and plunge into the parenchyma of this body.

All such modifications, however, merely depend on the mode by which the allantois contracts its adhesions with the point of the ovum in contact with the womb. In fact, the placenta is always developed there, and if the allantois happens to strike the chorion at a part somewhat removed from that which is in apposition with the internal uterine surface, the umbilical vessels must evidently have a tendency towards the latter, just as the roots of a plant always stretch towards the spot which will afford them the most nourishment.

* The ancients thought they could determine the fecundity of the female by these knots; thus, according to Avicenna, the more knots the more will be the future conceptions; and if they occur at some distance apart, the pregnancies will also be more distant from each other.

Fig. 44.



An anomaly, described by Benckiser.

CHAPTER IV.

OF THE FŒTUS.

WE shall not attempt to study the fœtus by describing the different organs, and the various tissues successively, that enter into its structure at the moment of birth, nor by tracing each of them through the modifications it undergoes at the divers periods of the intra-uterine life; for such a course would evidently compel us to overstep the limits imposed by the nature and character of this work. Therefore, laying aside all embryological researches, we shall content ourselves with mentioning a few interesting particulars of *organogeny*; and while considering the fœtus in a general manner, we shall point out succinctly the successive development of its form and its external parts. But before entering upon this subject, we believe it will prove profitable to present, in a figure, the various details already furnished, as such an exposition will complete the description previously made, and facilitate a knowledge of the facts we have yet to speak of.

Explanation of the Figures in Plate I.

Fig. 45.—The human ovum, of its natural size, at about the 30th or 36th day.
 Fig. 46.—The same ovum (of its natural size) laid open to show its constituent parts: a A. The chorion. b. The amnios. c. The fœtus. d. The umbilical vesicle.

Fig. 47.—The same ovum highly magnified, and opened in such a way as to exhibit the principal relations existing between the embryo and its appendages. The walls of the abdomen and chest have been cut away so as to bring the viscera into view, and the umbilical cord has also been split up for the purpose of showing how the appendages of the fœtus are brought into relation with this latter. a A. The chorion, consisting of two layers placed back to back, and confounded with each other, but which have been dissected apart for a limited extent at a' a'. b B. The amnios, laid open so as to show how it is continuous with the umbilical cord, along which it is reflected, thereby forming a sheath, which, under the form of the canal b' n', is directly continuous with the umbilicus or the abdominal walls c c of the embryo. d. The umbilical vesicle, and d' its pedicle. d''. The point where this pedicle communicates with the intestine e. e. The loop of intestine prolonged into the cord. f. The urachus, continuous by one extremity, g, with the chorion, and by the other with the rectum at the point h. i. The umbilical arteries. j. The umbilical vein. j'. The part of the right auricle from which the umbilical vein comes off. k. The vena cava inferior. m. The inferior surface of the liver. n. The omphalo-mesenteric vein. o. The point where this vein empties into the umbilical vein. p. The omphalo-mesenteric artery. 1. The heart. 2. The arch of the aorta. 3. The pulmonary artery. 4. The lung of the right side. 5. The Wolffian body. 6. The branchial fissure which is converted into the external ear. 7. The lower jaw. 8. The upper jaw. 9. The nostril of the right side. 10. The nasal canal still forming a kind of fissure, which extends from the eye to the nostril. 11. The caudal extremity, or coccyx, projecting like a tail. 12. The upper extremity. 13. The lower extremity.

Fig. 15



Fig. 16

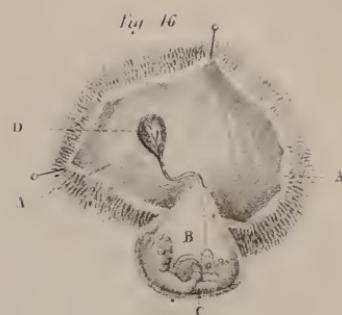
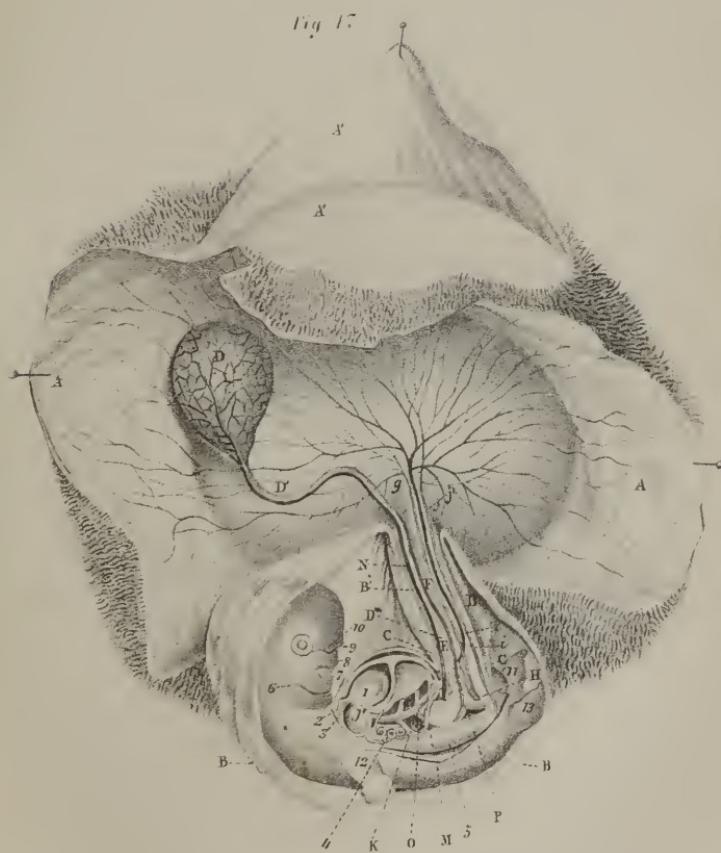
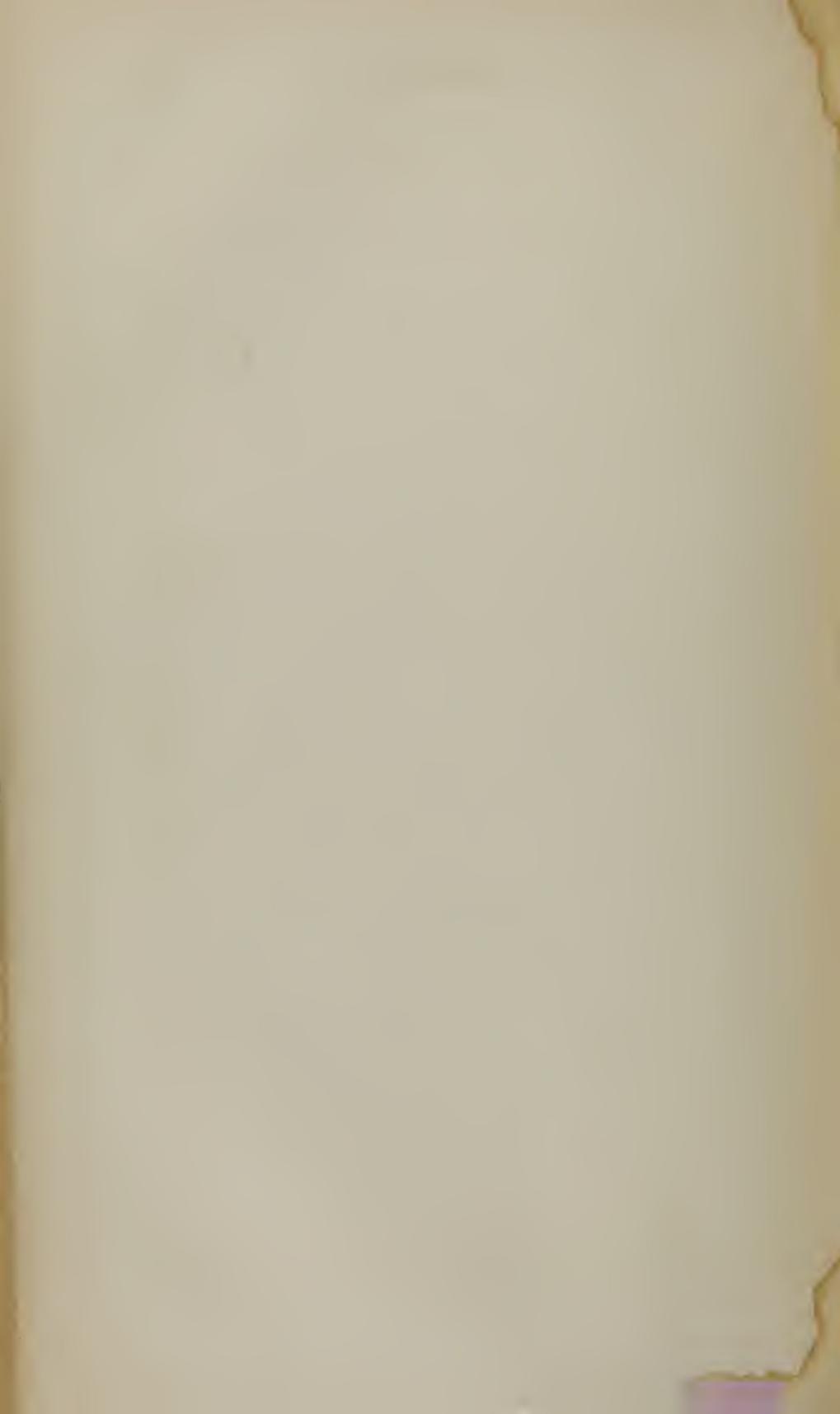


Fig. 17





ARTICLE I.

DIMENSIONS AND WEIGHT OF THE FŒTUS AT THE DIFFERENT PERIODS
OF INTRA-UTERINE LIFE.

At the time when the embryo first begins to be distinct, that is, at about the third week, it is oblong, swollen in the middle, obtuse at one extremity, though drawn to a blunt point at the other, and straight, or nearly so, being somewhat curved forwards. It is therefore vermiform in shape, of a grayish-white color, semi-opaque, almost without consistence, and gelatinous, varying from two to four lines in length, and weighing one or two grains. At this period, the only trace of the head is a small tubercle separated from the rest of the body by a notch, but no rudiments of the extremities are observed, nor is there a cord at first.

The embryo is clearly surrounded by the amnios, which reposes close to it, in the form of a delicate membrane, leaving it, however, always free; and the abdominal cavity is opened for a very considerable extent in front. The embryo becomes more consistent towards the *fifth week*: its head then increases greatly, in proportion to the remainder of the body, and the rudimentary eyes are indicated by two black spots turned towards the sides; the development of the thoracic extremities is announced by two small, obtuse teats, situated on the sides of the trunk; it is nearly two-thirds of an inch long, and weighs about fifteen grains; the cord exists as a rudiment, and the abdominal members are likewise present, in the form of two rounded pimples; and the vertebral divisions are quite apparent, all along the back, although the caudal vertebrae closely approach the front part of the head, in consequence of the embryo's anterior curvature.

Already does the heart exhibit, in its external form, a tolerably close resemblance to that in the adult; for, we may even now observe the fissure that will afterwards separate the auricles, as also one corresponding to the inter-ventricular partition; but there is, in reality, only one ventricle from which both the aorta and the pulmonary artery arise. And, further, there is but one auricle; or, rather, the two communicate so freely together that the intermediary contraction which should divide them is still very imperfect; for the partition is formed by the progressive contraction of the orifice of communication, and this incomplete opening, which sometimes persists in the septum until birth, is known under the name of the *foramen of Botal*. But, after birth, the opening becomes obliterated, and the two auricles are thenceforth isolated by a complete partition.*

* I am satisfied, from repeated examinations, that the foramen of Botal does not become so perfectly obliterated as is generally taught in the books; for, in a very large proportion of young adults, there is still a communication existing between the two auricles—sometimes permitting the handle of a scalpel to pass through, and at others not larger than a pin's head.—*Translator.*

The single ventricle will be converted into two cavities, by the intervention of a septum which will be gradually developed from the summit towards the base, being placed between the two arteries (the pulmonary and aorta), and so disposed as to leave one opening into the right and the other into the left cavity.

The lungs at this period are constituted of five or six lobules, in which we can readily distinguish the bronchial extremities, terminating in some slightly swollen cul-de-sacs. Moreover, two enormous glandular structures lie along the vertebral column at this period, extending longitudinally on each side, from the lung to the bottom of the pelvis. These are the Wolffian bodies. They are constituted by an excretory canal, which runs throughout their whole length, being placed on their external margin and terminating below in the transitory cloaca. The canal forms (on one of its sides only) a series of more or less elongated cœca, which roll or curl up, and then form a considerable mass by their agglomeration. These cœca secrete a liquid, which is subsequently emptied into the cloaca by means of the canal.

The bodies of Wolff anticipate the function of the kidneys until the latter are developed, and hence they have been denominated the *false kidneys*; but they disappear as soon as the true organs can replace them, leaving no trace of their past existence. Just alongside of the excretory canal, in the Wolffian body, a second one is seen to accompany it throughout, and even in like manner to empty into the cloaca. But this second canal is perfectly distinct from the other, and will become, in the adult, either the oviduct or the vas deferens, according as the new being shall be of the masculine or the feminine gender.

In the early stages of embryonic life, there likewise exists on each side of the neck, in the human fœtus (as also in the mammiferæ), four transverse fissures which open into the pharynx. These are separated from one another by certain bands, or fleshy partitions, that correspond with the branchial arcs of fishes; for the vascular apparatus distributed there affects, to a certain extent, the same form temporarily, that it has permanently in the inferior vertebratæ. We therefore see that the bulb of the aorta, instead of curving immediately in a single arch, divides, on the contrary, into three or four branches, on each side of the neck; and after these branches have each accompanied a branchial arch, they reunite, at a common point, to form the descending aorta; however, they are soon effaced along with the corresponding fissures, and but two remain on the left side, one of which is converted into the arcus aortæ, while the other, after having existed as an arterial canal, will form the common trunk of the pulmonary arteries.

The branchial fissures just under consideration also disappear, with the exception of a single one (the first on each side), which is converted into the external ear, as may be seen in the figure (47).

At this period, the upper jaw is still composed of two papulæ, one for each side. These pimples, or isolated mandibles, gradually

approach the median line, and there unite in a single body, which forms the jaw such as we find it in the adult.

The nostrils are separated by the incisive papulae, which keep them apart for some time; then, as the latter diminish in size, they approximate each other and assume their definitive form; but, in the mean while, they are separately split down to the mouth, and it is the permanence of this transitory state that constitutes the double hare-lip. All of the branchial fissures have disappeared by the sixth week, leaving only a slight cicatrix behind.

The first centres of ossification appear during the seventh week on the clavicle and the lower jaw. The intestine still extends for a considerable distance along the interior of the umbilical cord, but the omphalo-mesenteric canal is nearly obliterated, although it may yet be traced as far as the umbilical vesicle, where it is reduced to a very delicate thread. The anus remains closed; and the bodies of Wolff alone exist near the vertebral column. It is only then that the kidneys and capsulae renales begin to appear, and soon after them the sexual organs. The urinary bladder is first manifested under the form of a tumor that is continuous with the urachus. Lastly, the embryo is then nearly an inch in its length.

At two months, the tubercles of the extremities become more prominent. The forearm and hand can be distinguished, but not the arm; the hand is larger than the forearm, but it is not supplied with fingers. The cord has not as yet assumed a spiral arrangement, but it is infundibuliform in shape, the base corresponding to the abdomen, and in fact continuous with it, and containing a large quantity of intestine; it is four to five lines in length, and is inserted quite low down in the belly. A small tubercle, furnished with one or more very contracted openings, may be distinguished between it and the termination of the spine, which are the rudimentary external organs of generation; but the extreme length of the clitoris renders the distinction of the sexes difficult at this period.

The embryo is from one and a half to two inches long, and weighs from three to five drachms, the head forming more than one-third of the whole. The eyes are prominent, but the lids, from being still rudimentary, do not cover the eyeball; the nose forms an obtuse eminence; the nostrils are rounded and separated; the mouth is gaping, and the epidermis can be distinguished from the true skin.

At ten weeks, the embryo reaches one and a half to two and a half inches in length, and weighs an ounce or an ounce and a half. The palpebrae, having become more apparent, descend in front of the eye, and the puncta lachrymalia are now visible; development commences in the lips, and an obliteration of the buccal fissure, which has also grown larger.

The thoracic parietes are apparent; hence the heart's movements cease to be visible. The fingers are distinct, and the toes look like little tubercles held together by some soft substance. The cord is longer than the embryo, and begins to assume the spiral arrange-

ment; it is less infundibuliform than previously, and is not inserted so low down on the abdomen, but its base always contains a portion of intestine.

At the end of the third month, the embryo weighs three to four ounces, and measures from five to six inches; the cycball is seen through the lids; the membrana pupillaris is more manifest; the forehead and nose are clearly traceable, and the lips well marked and not turned outwards. The neck now establishes a visible separation between the head and thorax; the latter cavity is closed at all points, but is still very slightly developed relatively to the other cavities. The cord contains no intestine, and its spiral turns are more numerous and evident. The nails begin to appear as thin membranous plates; the sex is distinct, and the integuments, which heretofore were only a soft, viscous covering, acquire more consistency, but are still very thin, transparent, of a roseate hue, and without an apparent fibrous texture.

At the fourth month, the embryo takes the name of the *fœtus*; its growth is not so rapid in the commencement, as at the end of this month. The body is six to eight inches in length, and weighs from seven to eight ounces. The fontanelles are very large, as are also the sutures; and some short, whitish, silvery hairs may be observed on the head. The face still remains but little developed, although more elongated than it has previously been. The eyes, nostrils, and mouth are closed, and when the occlusion of the lids happens to be incomplete, it is generally at the internal part. The tongue may be distinguished behind the buccal fissure, and the projection of the chin is observable. The cord is inserted higher up on the abdomen, whence the centre of the body is an inch or two above the umbilicus. The skin has a rosy color and begins to be covered by down, and some fat, tinged with red, is deposited in the areolæ of the sub-cutaneous cellular tissue, and the muscles now produce a sensible motion. A *fœtus* born at this period might live for several hours. Whilst I was Interne at the Hôtel Dieu, I received one that had scarcely reached the fourth month. It lived, however, from half-past seven to half-past eleven o'clock.

At five months, the length of the body is eight to ten inches, and it weighs from eight to eleven ounces. The skin is more consistent, and many patches of sebaceous matter may already be seen, but the pupils cannot be distinguished.

At six months, the length is eleven to twelve and a half inches, and the weight about one pound (*avoir.*). The hair is both longer and thicker, the eyes closed, the eyelids somewhat thicker, and their margins as well as the eyebrows are studded with very delicate hairs. Agreeably to most authors, the membrana pupillaris always exists; on the contrary, the pupil at this period has seemed very large, both to M. Velpeau and myself. The skin is better organized, for the dermis and the epidermis may be distinguished, though its surface is wrinkled and puckered, owing to the small quantity of subcutaneous fat. The nails are solid already. The scrotum is very small, quite red, and empty.

At seven months, the foetus acquires a length of twelve and a half to fourteen inches; all its parts have become more consistent and voluminous, and their respective dimensions better proportioned. The bones belonging to the vault of the cranium exhibit near their centres a considerable prominence at the point where the first rudiments of ossification occur, whence it follows they are less uniformly arched than at the succeeding periods, and more curved than in the former months, when they were in reality nearly flat. The pupillary membrane disappears completely; indeed, according to M. Velpau, this membrane does not exist at any period of the intra-uterine life. The iris commences as a simple ring, which then grows in a concentric manner, leaving only at last the opening called the pupil. The palpebrae are partly open, and the descent of the testicles into the scrotum now begins.

At eight months, the foetus seems to grow, as Desormeaux remarks, rather in thickness than length; in fact, its body is only sixteen to eighteen inches long,* whilst it weighs from four to five pounds. The skin is very red, and is covered with long down and a considerable quantity of sebaceous matter.† The lower jaw, which was at first very short, is now as long as the upper one. The scrotum usually contains one testicle, generally that on the left side.

Finally, at term, the foetus is about nineteen to twenty-three inches long, and weighs from six to seven pounds. Although, in consequence of the development at the inferior part of the trunk, the umbilical ring is now considerably removed from the hypogastric region; yet the insertion of the cord does not correspond, as has been stated, with the centre of the body. Thus, in a foetus whose total length is twenty-three (20?) inches, we shall generally find ten and a-half to eleven inches from the apex to the umbilicus.

Indeed, from the researches of M. Moreau, communicated to the Academy of Medicine, it appears that in ninety-four children born at nine months, four only had the umbilical insertion in the middle of the body, while in ninety others it was below this. The mean of the variations was nearly an inch; and M. Ollivier d'Angers has also observed the same thing in thirty children examined by him.

The weight and length of children at birth have been wonderfully exaggerated in many cases; thus, some are recorded of a yard or

* The author has evidently used the term *body* here, as comprising both the body and the inferior extremities.—*Translator.*

† About the middle term of the intra-uterine life, the skin is covered by a constantly increasing mass of a fat, slippery, viscous substance, yellowish-white in color, called the sebaceous coat, or vernis casseux. This substance is more abundant on some embryos than others, and is in greater quantity on certain places, as for example the head, axilla, and groins; it is insoluble in water, alcohol, and oil, and only partially soluble in potash. It is not a precipitate furnished by the amniotic liquors, as some persons have imagined, for there is none of it on the external surface of the amnios, nor on the umbilical cord; it results from a secretion of the foetal skin, and is, as far as we can judge by its composition, an assemblage of effete epidermis and matters furnished by the sebaceous glands, aiding perhaps in the hour of labour by facilitating the expulsion of the child.

more in length, and others that weighed nine, ten, twelve, and even fifteen kilogrammes (the kilogramme is equivalent to 2 lbs. 8 oz. troy); but there must certainly be great exaggeration in such details, for the most voluminous of three thousand children, born under my charge, either in the Hôtel Dieu or at la Clinique—weighed ten pounds, and it was an enormous one; further, I do not remember ever having seen one longer than twenty-two inches.

In four thousand children delivered at la Maternité, one only weighed twelve pounds. (*Lachapelle.*)

Baudelocque asserts, that he superintended the delivery of one of twelve pounds and three quarters; and Merriman, one weighing fourteen pounds; Richard Crofts, another of fifteen pounds; lastly, Mr. J. D. Owens, a surgeon at Haymoor, near Ludlow, has seen a stillborn infant that weighed seventeen pounds twelve ounces, and had the following dimensions:—

Occipito-frontal diameter	$7\frac{1}{4}$	inches,
Occipito-mental "	$8\frac{1}{2}$	"
Bi-parietal "	5	"
Total length,	24	"

On the whole, therefore, we may conclude that the foetal growth is rapid for the first three months, then it slackens off about the middle of pregnancy, and again becomes greatly accelerated during the last three months.

Chaussier has given the following as the proportions exhibited by the different parts of the foetus at birth (taken from a child $19\frac{1}{2}$ inches long), namely:—

From the apex of the head to the pubis,	$12\frac{1}{4}$	inches,
" the pubis to the feet,	$7\frac{1}{4}$	"
" the clavicle to the bottom of the sternum	2	"
" the latter to the pubis,	$6\frac{1}{4}$	"

With regard to the *transverse* measurement he found as follows:

From the top of one shoulder to the other (<i>bis-acromial</i> or <i>transverse diameter of the thorax</i>),	$4\frac{3}{4}$	inches,
" the sternum to the spine (<i>antero-posterior diameter</i>),	$3\frac{3}{4}$	"
" ilium to ilium (<i>transverse diameter of the pelvis</i>),	3	"
" one femoral tuberosity to the other,	$3\frac{1}{2}$	"

We shall examine hereafter the dimensions of the head.

Fortunately, these diameters are reducible; thus, the *bis-acromial* in particular, which presents four and three-quarter inches, may be reduced to three and three-quarter inches, by compression.

ARTICLE II.

HEAD OF THE FOETUS AT TERM.

The head of the foetus merits the particular attention of the accoucheur, for in fact it is the most voluminous and least compressible

part of the whole child; and it is, therefore, highly important to ascertain whether its different diameters are proportional to those we have heretofore studied in the pelvis. Being likewise the part that most frequently presents first in the accouchement, we have to learn the different characters it exhibits, in order that we may recognize it.

The head of a boy is generally larger than the corresponding part of the girl; the difference, according to Clark, is about one twenty-eighth or one-thirtieth: and it is probably owing to this cause, says Burns, that females "who have the pelvis in any measure contracted, have often a more tedious labour when they bear sons than daughters." And, for the same reason, there are more males than females among stillborn children. Thus, in eighty-four of this class, forty-nine were boys and thirty-five girls.

The fœtal head, considered as a whole, is ovoidal in form, the large extremity being posterior, the small, anterior; as, in the adult, it is composed of the cranium and face; but the latter scarcely deserves a particular notice, and we refer for a knowledge of its different constituent parts to the works on anatomy. Several bones enter into the formation of the cranium; these are—

The *frontal*.—A symmetrical bone forming the forehead, as well as the superior-anterior part of the face—consisting in the fœtus of two portions.

The two *parietal*.—One upon the right, the other on the left side, meeting at the median line: they are situated upon the superior-lateral parts of the head, and concur in forming the vault of the cranium.

The *occipital*.—A symmetrical bone constituting the posterior part of the skull, as also a portion of its base.

The *temporal*.—Two bones placed, one on the right, and the other on the left side, below and beneath the parietal, completing the lateral portions of the cranium, and contributing to the formation of its base; lastly, the *sphenoid* and the *ethmoid*, which belong exclusively to the base. These bones are not united to each other at birth by serrated articulations, like they are in the adult (*synarthrosis immobile*), but are separated, those of the vault especially, by membranous intervals of greater or less extent, according to the progress the ossification has made, which spaces have received the name of the sutures, or *fontanelles*.

This disposition of the vault offers several advantages: for instance, it facilitates at first the development of the brain, and then (what is not much less important in the accoucheur's eyes) it permits a certain reduction in the head's diameters; for when this organ is subjected to a forcible compression, the margins of each bone approach or even overlap each other, thus diminishing its volume. But we must not, however, magnify the extent of this overlapping, because, as M. Malgaigne remarks, if we examine this matter closely, we shall find that the membrane interposed between the parietal bones, is too firm to be drawn out, and too narrow to permit a notable over-riding; and further, it usually maintains these two bones so

close together, that the superior margin of one laps over the other, leaving even on the dried skull a true normal crossing. Some of those sutures, or fontanelles, are highly important in an obstetrical sense, and we shall next proceed to their consideration.

The *sagittal*.—The great or the antero-posterior suture extends from the root of the nose to the superior angle of the occipital bone; being formed in front by the interval that divides the frontal bone into two halves, and in the middle, and posteriorly, by that between the parietals. At the superior and internal angle, formed by the two portions of the frontal bone, this suture is joined at the sides by the two *fronto-parietal* or *transverse* (coronal) sutures, which are formed by the space existing betwixt the superior border of the frontal and the anterior margin of the parietal bones, and crossing the former suture nearly at right angles.

Having arrived at the superior angle of the os occipitis, it seems to bifurcate, and give rise to two oblique lateral sutures formed by the posterior borders of the parietal bones, and the superior one of the occipital. These latter are called the *lambdoid* sutures, probably from their resemblance to the Greek capital Λ (*lambda*). Just at the points where the fronto-parietal and the lambdoid sutures join the sagittal one, some membranous spaces, much larger than those just described, are found to exist, which have received the name of the *fontanelles*.

The great or *anterior fontanelle* is the one formed by the junction of the two transverse sutures with the sagittal. It is also called, from the fact of its corresponding with the bregma, the *bregmatic fontanelle*; in general, it presents an extensive surface, bounded by four bony angles, as the lateral sutures that leave it do so nearly at a right angle. It is lozenge-shaped, and is usually much more prolonged into the frontal than between the parietal bones. Sometimes even, according to M. Gerdy, Jun., it scarcely ceases short of the nose, the margins of the coronal suture being parted throughout their whole extent by an interval which gradually diminishes from above downwards, and being only about one or two lines wide at the root of the nose. It is not at all uncommon to find at the lower part of this suture a void, or a rounded or oval membranous space, varying from three to seven lines in its diameter.

The *posterior* or occipital fontanelle is formed by the union of the two lambdoid sutures with the termination of the sagittal suture; it is smaller than the preceding, and is of a triangular form, being bounded by three osseous angles. The lateral sutures leave it at an acute angle. Sometimes the two portions of the os occipitis are not fused into each other at birth, and in such cases a median suture exists, which separates them, and terminates in the posterior fontanelle. The latter has then a lozenge shape, and is subtended by four osseous angles, and can only be distinguished from the anterior by the obliquity in the lambdoid sutures. The opposite condition is observed at times, the triangular space known as the posterior fontanelle not existing at all, because the occipital salient angle then fits in and fills up the entering angle formed by the parietal bones;

but the convergence of the three sutures, and the prominence of the osseous margins which overlap each other will aid the diagnosis (Malgaigne); for when the head is engaged in the excavation, and has become strongly compressed, the superior angle of the occipital bone is completely concealed by the internal or supero-posterior angles of the parietals; and if the touch is resorted to under such circumstances, the finger can only recognize the position by detecting the little hollow formed by the depressed occipital angle. Of course, particular attention must be given in this case to the oblique direction of the lambdoid sutures.

Another source of error also exists; that is, places are frequently found over the cranium where the ossification is less advanced than usual, and this defect of osseous growth is compensated by the presence of a membranous bridge which may be mistaken for a fontanelle. Such an error might the more readily have occurred in the four cases of this kind I had an opportunity of observing, from the fact of the accidental fontanelle being situated just in the course of the sagittal suture, about equi-distant from the anterior and the posterior ones; and as this point is precisely where the finger first falls, in practicing the touch, we might mistake it for a fontanelle. But, by a little attention, it will always be easy to avoid this error, by ascertaining that no lateral sutures pass off from this membranous interval.

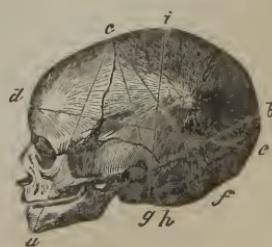
There yet remain some other sutures, and some other fontanelles on the inferior-lateral parts of the cranium; but as they are devoid of interest we shall not describe them.

Diameters of the Head.—The term diameter has been applied to certain fictitious lines which traverse the head in a determinate direction; though, to avoid overloading the memories of students, we shall not multiply their number as some have done; but, following the example of M. Velpeau, shall describe only seven at first, as it will be very easy to supply the deficiency hereafter in treating of the mechanism of labour.

Seven diameters, then, may be distinguished for the fœtal head, which we divide (to facilitate their study) into the antero-posterior, the transverse, and the vertical.

1st. The antero-posterior diameters are: the occipito-mental, *a b* (*vide* Fig. 48), extending from the posterior fontanelle to the chin; this is the longest of all, being five and a quarter inches. The occipito-frontal, *d e*, which extends from the occipital protuberance to the frontal boss (also called the antero-posterior diameter): it measures four and a quarter to four and a half inches. The sub-occipito-bregmatic, *c f*, extends from the middle of the space between the foramen magnum and the occipital protuberance (to the anterior fontanelle.—*Transl.*), and is three and three-quarter inches.

Fig. 48.



2d. The transverse diameters are two in number; one, the bi-parietal, *a b* (*vide* Fig. 49), goes from one parietal protuberance to the other; it is from three and a half to three and three-quarter inches long. The other, the bi-temporal, *c d*, passes from the root of the zygomatic process on one side to the same point opposite. It is two and three-quarters to three inches long.

Fig. 49.

3d. Lastly, there are two vertical diameters; first, the vertical diameter, properly so called, or the *trachelo-bregmatic*, *i h* (*vide* Fig. 48); this leaves the preceding somewhat obliquely, and runs from the anterior part of the occipital foramen to the anterior fontanelle; it is three and three-quarter inches in length; the second, the *fronto-mental*, or the facial, *d a*, extends from the frontal boss to the point of the chin. This is three inches.

Circumferences.—A circumference has been assigned to each of the above-mentioned diameters, since it is very easy to describe from the middle of every one of them, as a centre, a circle whose radius is equal to one-half of the diameter, and passing through the two extremities of the latter. As a matter of course, the head's largest circumference corresponds to the occipito-mental diameter; and, having to pass through the two ends of this last, it will evidently divide the cranium into equal lateral parts.

The occipito-frontal periphery, agreeing with the diameter of the same name, runs horizontally, a little below the extremities of the transverse diameter, and separates the vault from the base. The sub-occipito-bregmatic one passes through the extremities of both the occipito-bregmatic and the bi-parietal diameters, being thus the circumference of each of them.

The two latter are the most important of all, because they successively come into relation with the parietes of the pelvis in the progress of natural labour.

The circumferences belonging to the other diameters scarcely offer any interest, and we shall, therefore, merely mention them in passing; in number they equal the diameters.

That of the fronto-mental, however, should be noticed as passing over the forehead, cheeks, and chin, being also called, on that account, the facial circumference.

The diameters just described, although but little reducible in their dimensions, are not absolutely invariable. Thus, it is only necessary to witness a few difficult labours to become satisfied that, in such cases, the head is most frequently elongated in the direction of the occipito-mental diameter, and flattened in its transverse one. And we further learn, from the experiments of Baudclocque, that the bi-

parietal diameter (*vide art. Forceps*) may be reduced one-fourth, or one-third of an inch, by the aid of instruments; indeed, we have even known this diameter to be diminished much more than that under the efforts of the womb alone, without any accident occurring to the child.

We present in the following table the diameters of the foetal head, as also those of the pelvis, before described; and we hope, by thus collecting them in a tabular form, that their acquisition will be rendered more easy:—

Diameters of the pelvis. (In inches.)	Antero-posterior.	Transverse.	Oblique.	Sacro-cotyloid.
Superior strait	4 $\frac{1}{2}$	5 $\frac{1}{4}$	4 $\frac{3}{4}$	4 to 4 $\frac{1}{8}$
Inferior strait	4 $\frac{1}{4}$ to 4 $\frac{3}{4}$	4 $\frac{1}{4}$	4 $\frac{1}{4}$ to 4 $\frac{1}{2}$	" "
Excavation	4 $\frac{3}{4}$ to 5 $\frac{1}{8}$	4 $\frac{3}{4}$	4 $\frac{3}{4}$	" "

FœTAL HEAD.

Longitudinal diameters	do	Transverse	Occipito-mental	5 $\frac{1}{4}$	inches.
			Occipito-frontal	4 $\frac{1}{2}$	do
			Sub-occipito-bregmatic	3 $\frac{3}{4}$	do
Transverse	do	Bi-parietal	3 $\frac{1}{2}$ to 3 $\frac{3}{4}$	do	
		Bi-temporal	3	do	
Vertical	do	Trachelo-bregmatic	3 $\frac{1}{2}$ to 3 $\frac{3}{4}$	do	
		Fronto-mental	3	do	

The fundamental principles of midwifery are deduced from the correspondence between the foetal dimensions and those of the pelvis. It happens, in fact, that the child at term can only clear the pelvic canal by presenting one end of its long diameter; that, whichever extremity this may be, the delivery will still remain impossible if the head should present in such a manner as to have its occipito-mental diameter *parallel* to those at the inferior strait; that, consequently, the occiput must always engage before the chin, or *vice-versâ*; and, lastly, that the most favorable position requires the head to be strongly flexed upon the trunk, so as its smallest diameter (the sub-occipito-bregmatic) shall be parallel to the plane of the superior strait; and, when it reaches the excavation, the occiput shall still correspond to one extremity of an oblique diameter.

The articulation of the head, with the vertebral column and the movements it permits, should also be carefully studied: thus, the occiput is connected to the atlas by a close union, which only admits the motions of flexion and extension; but these are much greater in the fœtus; but the atlido-axoid articulation, on the contrary, is ginglymoid, only permitting a rotatory action, which is limited to the fourth of a circle, whence the conclusion is manifest that whenever the head is caused to rotate—the body being fixed—great care must be exercised not to pass the limits indicated; for generally the fœtus would thereby suffer a mortal lesion. We say generally, not always, because two cases cited by Prof. Paul Dubois, evidently prove that children may not only survive this accident, but even seem to experience no bad effects whatever from it.

The great laxity of the articular ligaments in the infant can alone explain the little danger attending an occurrence which would prove so disastrous in the adult. Finally, the natural situation of the head is such in the new-born child, that the chin descends much lower than the occiput, and the axis of the trunk traverses the cranium obliquely from base to summit, and from before-backwards, passing a little in front of the posterior fontanelle.

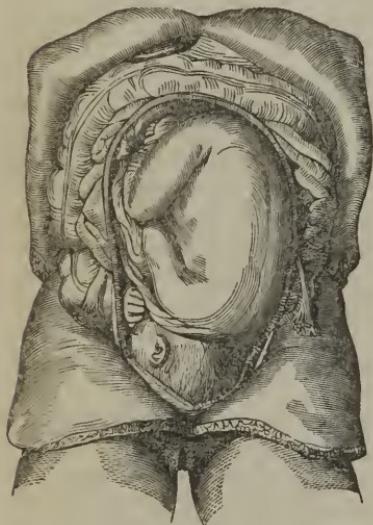
ARTICLE III.

POSITION AND ATTITUDE OF THE FÆTUS.

THE fœtus lies curled up on its anterior plane in the midst of the surrounding sac; usually, the head is somewhat flexed, the chin resting on the anterior-superior part of the breast; the neck is so short that a slight degree of flexion will answer, says M. Dubois, for this purpose; the feet are bent up in front of the legs—the latter strongly flexed on the thighs, and these last are applied against the

anterior abdominal surface; the knees are separated from each other, but the heels lie close together on the back part of the thighs; the arms are placed on the sides of the thorax; the forearms being flexed and thrown across the sternum, so as to receive, as it were, the chin between the hands. The fœtus, thus folded on itself, constitutes a whole that is nearly ovoidal in shape; the longest diameter of which is about eleven inches, having its larger extremity represented by the breech turned towards the fundus uteri, while the smaller, formed by the head, looks downwards. Now, it is evident that this constrained position could not have been produced by the mere pressure of the uterine walls on the child, since the latter is in a cavity

Fig. 50.



The usual position of the child in the womb.

much larger than its whole volume; hence, it must be referred to the individual itself.

The dependent position of the head at term is so common, that we are naturally led to an inquiry concerning the cause of this phenomenon; formerly, it was supposed that, after having reached the uterus, the head occupied the fundus for the first seven months of gestation, and the pelvic extremity its inferior part; but, towards the expiration of this period, the fœtus reversed its position; the head approaching the orifice, and the breech going above.

This was the received doctrine until the arguments of Delamotte, Smellie, and Baudelocque (the latter, especially) completely subverted it; and since then, it has been generally admitted that the fœtus, suspended, so to speak, in the amniotic fluid, by the umbilical cord, would naturally observe the law of gravity; that is, the head being the heaviest part would descend; but this explanation had scarcely been adopted, when M. Dubois, after re-examining the question, proposed another theory; thus, he urged the following objections (whose value we fully acknowledge) against the influence of specific gravity, to which the great frequency of vertex presentations had been so uniformly attributed, viz.: 1. If a child be plunged into a considerable quantity of any liquid, contained in a bathing-tub, for instance, so that its descent will be very slow, in order to afford the head sufficient time to exert its superiority in weight, we shall find all parts of the fœtus to descend with an equal rapidity, and consequently, either the back or one shoulder will first reach the bottom of the tub. This result, which is contrary to the general belief, is more in accordance with what is learned from an attentive examination of the foetal structure; indeed, when a comparison is made, between the volume of the cephalic and the pelvic halves of the fœtus, it would naturally appear that their weight must be nearly balanced; true, the cranial cavity contains a well-developed brain, but the abdominal one encloses the liver, which is no less, as also the intestines and bladder, together with the meconium and the urine accumulated therein during pregnancy; 2. It is really impossible to believe that the fœtus is suspended by the cord alone during the early stages, for even at the third month the cord is longer than the greatest diameter of the uterine cavity, and therefore its insertion near the pelvic extremity can in nowise contribute to the more frequent presentation of the head; 3. Besides, those women who maintain the horizontal position during gestation on account of ill health, are not the less likely to exhibit the same phenomenon; 4. If the laws of gravity alone determined the position, the head being more voluminous relatively to the trunk—during the early months—the fœtus should present, in cases of abortion, by the cephalic extremity still more frequently than at term; but observation establishes the contrary; 5. Lastly, in animals, the lowest part of the organ does not correspond with the neck, but rather to the fundus, of the womb; nevertheless, the fœtus is much oftener delivered by the head than the pelvic extremity.

After having tried to combat the generally received opinion by the objections just given, M. Dubois endeavors to prove that the vertex presentation is a consequence of the instinctive will of the fœtus itself. . . . The child, in its mother's womb, has the faculties of perception and motion; for the regular and nearly constant succession of the perception of impressions, and the movements which follow, sufficiently indicate the same connection in the fœtus, between these two functions, that should exist after birth.

Now, the objects of these foetal movements are partly certain, partly presumptive; consequently, they may be regarded as verita-

ble instinctive determinations; again, it is by the effect of such a determination that the head in the mammiferæ is usually found at that part of the uterus nearest to the pelvic outlet.

We frankly confess that M. Dubois seems to us more skilful in destroying than in building up; and though the reasons by which he combats the doctrine hitherto received appear very strong, yet those whereon he founds his opinion are not fully convincing. He is entitled to credit, however, for having sought, in a higher order of ideas, the explanation of a singular fact, which does not seem, in the present state of our science, capable of elucidation by the material reasons heretofore given.

If we might be permitted to hazard an opinion, after so many others, we should unhesitatingly say they have erred by seeking only in the foetus, its form and structure, for the cause of those various positions exhibited by it in the uterine cavity.

Already have several authors endeavored to account for the rarity of trunk presentations, by the vertical, or the nearly vertical direction, in the long diameter of the uterus, which would naturally force the greatest foetal diameter in the same line; for instance, the cause of trunk presentations, says Wigand, must be referred less to the foetus itself than to a change in the ordinary elliptic form of the uterus. Now, by advancing a step further in the path they have marked out, may we not find a satisfactory explanation of the great frequency of vertex presentations in the form of the uterus, and especially in its mode of development at the different periods of pregnancy? For, when we reflect that the uterus is developed during the first six months at the expense of its fundus,—is spread out superiorly—but, on the contrary, is much contracted below—does it not become evident that the pelvic extremity, which, from being doubled up, is much more voluminous than the head, must naturally lie in the largest cavity—that is, towards the fundus; and, consequently, that the cranium will descend to the cervix? There can be no doubt that the inferior part spreads out in the last three months, nearly as much as the fundus; but, then, the foetal vertical diameter is too long to permit it to traverse the transverse diameter of the uterus; and hence, with some few exceptions, the child is forcibly retained in the position it first assumed.

Finally, can we not explain by this circumstance the position of twins, in cases of double pregnancy, where it frequently happens that one foetus presents by the pelvic extremity, and one by the head? In a word, the child, shut up in its close sac, and constantly subjected to movement, must assume, not instinctively but mechanically, such a position as will bring its largest parts into correspondence with the most spacious portions of the organ.

ARTICLE IV.

FUNCTIONS OF THE FœTUS.

The functions of the child while it remains in the uterine cavity, that require our particular attention, are its nutrition, its respiration, and circulation.

§ 1. OF NUTRITION.

Few questions in physiology have given rise to more discussion than this of foetal nutrition. However, it is universally admitted that the materials necessary to nutrition are furnished by the mother's body; but authors are not as unanimous in regard to the mode of their introduction into the interior of the product of conception; and, it has been asked—Do the liquids secreted by the internal uterine surface transude through the membranes, so as to reach the amniotic cavity, to be there taken up by the fœtus, or do they pass by the umbilical cord alone? In the first place, the latter does not exist during the early periods of pregnancy; and, again, the placenta, as we shall hereafter see, is rather an organ of hematosis than one of nutrition. The former opinion, therefore, only remains; and we are constrained to admit that, for a part of gestation, at least, the fœtus is nourished by the surrounding liquids. But, how does the amniotic fluid, which is evidently furnished by the mother, since it is the more abundant, while the fœtus is small, and then diminishes in relative quantity as the latter approaches term; how, I repeat, does this liquid get into the amniotic cavity? Now, as there is no other way, during the primary weeks of gestation, for the ovum to obtain the substances necessary to its development, and to the formation of the embryo, excepting through the membranes, we must admit that these are permeable. Furthermore, at the time when the ovum arrives in the uterus, a membranous sac (the *caduca*), filled with plastic material (the *hydropérione* of Breschet), occupies the cavity of that organ, and the external surface of the chorion, that comes into apposition with the reflected caduca, is covered, as elsewhere stated, by tufts of capillary villi, which absorb that liquid by being brought into direct or indirect contact with it.

At first this fluid is limpid, but it subsequently becomes lactescent, and more consistent. Moreover, the chorial villosities belonging to that portion of the ovum corresponding to the uterine wall likewise absorb the liquids secreted by the internal surface of the womb. Now, those secretions are found in the ovum between the chorion and amnios, where they form the *reticulated body*, as it is called, and also, probably, furnish the vitelline liquid; thence these nutritive juices are transferred to the amniotic cavity by transudation through the walls of the amnios. A certain part, however, is carried directly into the fœtus by the canal belonging to the umbilical vesicle.

The cavity of the caducous membrane, as also that situated between

the chorion and amnios, disappears about the fourth month, and with them the hydroperitone, the vitriform body, and the umbilical vesicle. And the question then arises: Does the plastic substance secreted by the uterus penetrate into the amniotic cavity, through the caduca, the chorion, and the amnios, without collecting in an appreciable quantity on the route; or, is it absorbed by the foetal placenta, and thence, by the umbilical cord, reaching the embryo itself?

Notwithstanding the considerable thickness of the three united tunics, I am disposed to adopt the first opinion—thus far, at least, that the chorial villi (among which the placenta is developed) are not all concerned in forming the radicles of the umbilical vessels, but that a certain number of them still retain their primitive function and continue to absorb the fluids secreted by the internal surface of the uterus. It is in this way that Eschricht, who believes the placenta proper is the foetal respiratory organ, supposes the utricular glands of the womb secrete a nutritive juice, intended for the embryo, which is absorbed by branches of the umbilical vessels, other than those that accomplish the respiration in the placenta.

MM. Prevost and Morin also regard the after-birth as an organ for the absorption of the plastic materials furnished by the mother through the foetal vessels. The liquid, they say, deposited from the uterine surface, will be taken up by the vessels of the cotyledons. Thus, in the ruminantia, if the ovum, with its cotyledons, be drawn from the womb towards the end of gestation, and, consequently, the foetal be separated from the maternal placenta (which may readily be done without laceration), a whitish liquid will be found in the cells of the uterine caruncles, and an analogous one may be expressed from the vascular brush of the cotyledons.

However that may be, the nutritive fluids certainly do not reach the foetus through the umbilical vessels, properly so called, and the child is therefore most probably nourished by the liquor amnii.

And it is impossible not to admit that this liquid is a secondary *embryotrophe*, drawn by the amnios from the fluid which has penetrated through the chorion. Again, the facility with which foreign substances pass from the mother to her offspring, proves that its source is in the maternal body, and not in the embryo, since liquids injected through the former have been found both in the latter and in the amniotic waters. An evidence of this fact, and also that extraneous matters do not primarily enter the foetal circulation, but first penetrate through the chorion and amnios, was afforded in an embryo of five months, whose mother had been poisoned by sulphuric acid. Its skin was found by Otto of a reddish-brown color, and as hard as parchment wherever it had come in contact with the liquor amnii, whilst no other organ was affected in that way. The amniotic fluid must be nutritive, for it contains albumen, osmazome, and some salts; in fact, young calves have been sustained two weeks on fresh amniotic liquor. Finally, the quantity of this fluid, and more especially that of the animal and nutritive substances found in it, is much diminished towards the end of pregnancy.

The liquor amnii may reach the body of the foetus by various routes, as: 1st. By *cutaneous absorption*. When the umbilical vesicle ceases to furnish nourishment to the embryo, the skin becomes developed, and, very probably, absorbs the surrounding amniotic liquid; it is even possible that the lymphatic vessels, which are highly developed in the foetus, are formed as a consequence of this absorption, just as blood-vessels are called into existence by the circulation.

Brugmans proved this absorption by an experiment: thus, after having extracted several living embryos of animals from the waters of the amnios, he noticed the plenitude of the cutaneous lymphatics, but not of the intestinal ones; and then plunging the limbs, previously tied, into this liquid, he found, after the lapse of some time, those lymphatics below the ligature were filled with lymph.

The epidermis is so excessively thin, that it can offer no obstacle to the imbibition, and the liquor amnii itself contains a large proportion of water. Again, the sebaceous matter which covers the foetus at birth, only becomes manifest at an advanced stage of pregnancy; and, lastly, this absorption has been directly proved in animals both by experiments and dissection.

2d. By the *intestinal canal*. Though the cutaneous absorption may suffice for the nutrition of the embryo, as is sufficiently proved by the birth of monsters and anencephalous foetuses with closed mouths, nevertheless, it is highly probable that the child makes some efforts at deglutition, at least towards the termination of pregnancy, thereby determining the introduction of fluids into the intestinal canal. Thus, embryos may occasionally be observed executing motions of respiration with their jaws, during which the waters would necessarily be swallowed; indeed, in ova, that have been frozen after their extraction from the cow, an uninterrupted band of ice has been found extending from the mouth to the stomach. And when the meconium is mixed with the amniotic liquid, it is sometimes detected in the throat, pharynx, and stomach. Lastly, hair is occasionally found there, which could only happen by deglutition.

Besides these two modes of absorption by the skin and the intestinal mucous membrane, some physiologists have supposed this fluid might be taken up in other ways; thus, according to some, the mammary glands are provided with conduits that act the part of lymphatics, absorbing the waters and carrying them to the thymus gland, to be there elaborated. Others suppose that the liquor amnii may enter the trachea and bronchia, and there undergo some modification which may render it suitable for nutrition. Lastly, Lobstein seems to think it might possibly enter through the genital organs. But all these opinions are merely hypothetical.

Most modern authors admit that nutrition occurs in the way just indicated, during the early months of pregnancy; but the majority also believe that this does not persist until term; and that, during the last five months of the intra-uterine life, the placental circulation is the principal agent in foetal nourishment. According to them the foetus is supported, during two-thirds of its intra-uterine

existence, by the mother's blood, derived from the placenta through the ramifications of the umbilical vein; some asserting there is a direct communication in this body, between the vessels of the mother and those of the child; and others, that the maternal vessels pour the blood into the placental tissue, where it is taken up by the umbilical radicles. But it is only necessary to recall the injections spoken of, when describing the placenta's anatomical structure, to reject, absolutely, all theories of direct communication between the vessels of the mother and the child; for, before we can admit that the maternal blood is poured into sinuses in the meshes of the placenta, and thence absorbed by the umbilical radicals, the existence of such receptacles must first be demonstrated by dissections. But nothing of the kind has ever yet been observed when the injections were made slowly and with suitable materials. All these pretended sinuses are simply produced by the vascular fissures (*crevasses*) through which the injections are poured into the placental tissue.

In a word, no communication exists in the latter, neither direct nor indirect, between the utero-placental and the umbilical vessels, since the finest possible injection thrown into the umbilical vein will return, if the pressure be sustained, through the arteries of the cord, but will never pass either into the maternal veins or arteries.

The placental vascular apparatus, therefore, does not contribute to the nutrition of the foetus; and unless it be admitted, as we have already supposed, that the other filaments which enter into the composition of the after-birth, which originally were canalculated, and constituted the shaggy coat of the chorion, maintain their primitive action, and continue to suck up the liquids secreted by the internal uterine surface, we must necessarily conclude that the placenta is wholly foreign to the foetal nutrition.

§ 2. RESPIRATION.

Does the foetus respire in the amniotic cavity?

If something analogous to respiration in the adult be sought for in the functions of the foetus, this question will doubtless be answered negatively; because the atmospheric air, having no access whatever, the foetal blood could not possibly obtain any elements from it. But does it, therefore, follow that the sanguineous fluid will experience no similar modification at any part of the circuit? Most physiologists think otherwise, and I share their opinion.

According to some, the liquor amnii is the modifying agent for the blood, and Beelard supposes that the lungs are the seat of such changes, the liquid reaching them through the air passages. Agreeably to M. Geoffroy St. Hilaire, the whole surface of the child's body absorbs air, or a vivifying gas, like insects, by a species of air tubes, or by minute fissures which exist on the lateral parts of the neck in young embryos. The resemblance between those fissures and the branchial apparatus in the fish has given rise to the belief of an analogous function; hence, they are called the *branchial fissures*.

But, says Bischoff, in the mammiferæ and man, these are never

have an organization justifying in the least the supposition of their being intended for respiration, they never have internal nor external branches; nor do we ever see, as in the *branchia*, vessels distributed either on their surface or in their interior.

Latterly, M. Serres has attempted anew to explain how respiration may take place in the embryo before the placenta is fully formed. He says the breathing apparatus of the human ovule consists of the chorion, the two caducal laminæ, the liquid contained between the latter, and of a particular class of villi (called by him the *branchial*), which, after having traversed the reflected caducous membrane, come into contact with this liquid. On one part, the reflected caduca is perforated by multitudes of foramina, which may be aptly compared to those on the cribriform plate of the ethmoid bone; and on the other, the chorial villosities, the *branchial* villi, entering the substance of this membrane, lodge in those openings, and thus are brought into immediate apposition with the liquid. M. Serres believes that this arrangement will offer all the conditions of a branchial respiratory apparatus; but this mode of respiration only lasts during the first fifteen or twenty days of the intra-uterine life; because, as the embryo is developed and grows, one part of the chorial villosities is transformed into the placenta, and the foetal respiration in the uterus then commences the second time, as the placental respiration. Then the branchial function decreases, the apparatus atrophies and disappears; at first, the branchial villosities of the chorion wither away; the caducal cavity is contracted; the liquid diminishes, and finally, the two laminae of the caduca being brought into apposition, unite and become confounded with each other, and hence, the placental respiration begins as soon as the after-birth is organized. In fact, this body is formed throughout in such a manner as to establish the greatest possible approximation between the maternal blood and that of the embryo; and, therefore, whether the interlacement we have described from the preparations of M. Bonami, be admitted, or the disposition pointed out by Weber be considered as an ascertained fact, in which the vascular fasciculi of the foetal placenta dip into the venous sinuses belonging to the maternal one; in either case, we say a prolonged contact between the two vascular apparatuses would necessarily result. And this mediate union, in which the two liquids are separated by fixed membranes, establishes between the foetal and the maternal blood the same relation that is known to exist in the lungs of the adult, betwixt the venous blood and the atmospheric air: thus, in the pulmonary organs the sanguineous fluid is brought into connection with the inspired air; true, there is none of the latter in the after-birth, but the maternal vessels are found there in great abundance, whose exceedingly delicate walls remain for a long time in contact with the umbilical radicles, the parietes of which are also thin and transparent.

Therefore, if nothing but thin, transparent membranes divide the foetal blood from that of its mother, is it not possible for the first to communicate some of its elements to the second? for does not the

air act through the walls of the pulmonary vessels on the blood contained therein? And further, is not such a modification of the foetal blood in the placenta sufficiently proved: 1st. By the early death of the child, when the umbilical cord becomes flattened from compression and its circulation thereby arrested. 2d. By the pathological phenomena of asphyxia, which are always present at the autopsy in such cases. 3d. By the antagonism known to exist between the after-birth and the lungs; in fact, the new-born infant may dispense with the pulmonary respiration, so long as its connection with the placenta remains uninterrupted, and this communication may be broken without danger as soon as it respires through the lungs; if it breathes freely the blood no longer passes along the cord, and should respiration cease it shortly flows anew; and 4th. By the difference in the sanguineous fluid circulating in the umbilical vein, and that in the arteries; a distinction not very manifest upon simple inspection, but which has been detected by physical and chemical experiments. Now, in the adult pulmonary respiration, the blood not only absorbs a certain proportion of oxygen from the air, but it also gives off some carbonic acid. Thus far, we have only learned that the foetal blood derives from the placenta a vivifying principle; but we have not observed the separation of those materials from it, which may be unsuited to the nutrition of the child. We may state, however, that most physiologists believe the liver is destined to the performance of this last elaboration, and to the removal of its superabundant carbon and hydrogen, which latter are employed in the formation of the bile, and contribute to the complete development of the organ. We know, in fact, the growth of the liver follows that of the placenta, that both have a perfect organization at the same periods, that the bile is a highly carbonized fluid, and that the liver has a similar chemical composition.

§ 3. SECRETIONS.

As it is not our intention to treat of all the various secretions which occur in the foetus, we shall confine our remarks to those of the bile, meconium, and urine.

1. *Secretion of Bile.*—The liver is the most voluminous of all the foetal organs. At three months its texture is soft and pulpy, not yet having the granular character visible at term; the gall-bladder at that period resembles a white thread, its inferior extremity being the largest, and its cavity exceedingly contracted. At five months the volume of the liver is much greater, the texture more condensed, and the gall-bladder more apparent; the secretion of bile then begins, and continues to augment thereafter throughout pregnancy. We have just stated what appear to us to be the principal elements of the bile. At the seventh month, the gall-bladder is filled with a yellow secretion, and a considerable quantity of this is also found in the intestinal canal.

2. *Meconium.*—During the early periods of the intra-uterine life, the digestive canal is merely moistened by a little fluid, but a more abundant secretion begins to take place towards the third month.

According to Lee, the stomach then contains a clear, acid, and non-albuminous fluid; whilst at the upper part of the small intestine a substance similar to chyme is found, consisting of pure albumen, and there is an analogous albuminous liquid in the biliary duct. The meconium exists in the intestinum tenue only, prior to the fifth month, being of a greenish-brown color, but after that period it reaches the large intestine, becomes of a darker hue, and finally accumulates in the rectum. This fluid is a mixture of bile with the products secreted by the intestinal mucous membrane.

3. *Urine.*—The urine never fills the bladder entirely in the human embryo; now as the kidneys are developed early, and their secretion commences at once, the urine must certainly be evacuated by some outlet; and on this account, certain embryologists have supposed that the bladder communicated originally with the allantois by means of the urachus, and that the cavity of this membrane was the ultimate reservoir of the urine. However, this is not the generally received opinion, for, as we have elsewhere proved, the allantois ceases to exist in the human species as a distinct vesicle long before the development of the kidneys; and the urine must therefore be expelled through the urethra into the amniotic cavity.

§ 4. CIRCULATION.

A. The foetal vascular apparatus exhibits certain anatomical peculiarities that do not exist in the adult, and which must be noticed, in order to render the account of the circulation comprehensible. Now, these characteristics evidently depend on the absence of the pulmonary respiration, for they disappear as soon as it is established; thus, for instance:—

1. It is well known that the heart in the adult is composed of four cavities; namely, a right and left auricle, and a right and left ventricle, each auricle communicating freely with the corresponding ventricle, but not with its fellow, being separated from it by a complete partition; whilst in the foetus this dividing wall exhibits an opening in it called the foramen of Botal, which becomes smaller as the pregnancy advances, and is wholly obliterated after birth, in consequence of a valve being developed on its inferior margin, which gradually diminishes the freedom of the passage, and is large enough at term to cover the orifice entirely.

2. In the adult, the pulmonary artery divides into two large branches, one for each lung; these ramify throughout its ultimate tissue, distributing there the venous blood derived from the right ventricle; and the sanguineous fluid is then taken up by the radicles of the pulmonary veins and carried back by them to the left auricle; but this vascular circle is interrupted in the foetus, where the two pulmonary arteries are very small, although their common trunk affords an origin to a voluminous canal which opens directly into the arcus aortæ, and is called the arterial canal or the *ductus arteriosus*.

3. The abdominal aorta bifurcates, so as to form the primitive iliac arteries, and each of these again divides into two branches, the hypogastric and the external iliac. In the foetus, the hypogastric

seems to be continuous with a large vascular trunk called the *umbilical artery*, but this is nearly obliterated in after life. The two umbilical arteries run forwards and inwards along the lateral and superior parts of the bladder, and soon curve forwards so as to reach the inner surface of the anterior abdominal wall, along which they ascend to the umbilicus, then pass along the cord, and ultimately ramify in the placenta.

4. Lastly, the foetus further differs from the adult in having an umbilical vein, which, commencing by numerous ramifications in the placental tissue, traverses the whole length of the cord and reaches the abdomen by passing through the umbilical ring; then, running upwards and to the right in the substance of the suspensory ligament of the liver immediately behind the peritoneum, it gains the horizontal or umbilical fissure of this organ at its anterior part, where it gives off a few branches that ramify in the right and left lobes. Just at the point where the two fissures of this viscus intersect each other, the umbilical vein becomes enlarged, and then divides into two branches; the posterior of which, called the venous canal, or *ductus venosus*, is a continuation of the primitive trunk, and goes sometimes to the vena cava inferior above the diaphragm, though at others it joins one of the hepatic veins, and the common trunk thus formed empties into the vena cava; the other branch is much larger, and runs to the right; it leaves the principal trunk lower down and more in front than the venous canal; then it unites with the vena portæ, producing a canal whose diameter is double its own. This is called the *canal de reunion*, or the confluence of the portal and umbilical veins. After a short course, this vessel subdivides and ramifies in the substance of the liver, anastomosing with the hepatic veins, which (as in the adult) finally reach the vena cava a little above the *ductus venosus*.

The plate, inserted in the front of the book, with the accompanying explanation, illustrates the whole vascular apparatus of the foetus, to which the reader is referred.

Explanation of Plate II., which exhibits the whole Vascular Apparatus of the Foetus.

- A. The heart. B B. The lungs. C. The spleen. D. The liver. X. The lobulus spigelii. E E. The kidneys. F. The thymus gland. G. The upper extremity of the rectum. I. The bladder. K. The ureters. II. The womb. O. The umbilical cord. 1. The aorta. 2. The brachiocephalic trunk. 3. The left primitive carotid artery. 4. The left subclavian artery. 5. The pulmonary artery. 6. The *ductus arteriosus*. 7. The vena cava superior. 8. The right internal jugular and the right subclavian veins. 9. The left subclavian vein. 10. The abdominal aorta. 11. The primitive iliac arteries. 12. The umbilical arteries, coming off from the bifurcation of the primitive iliac. 13. The external iliac artery. 14. The umbilical vein. 15. The *ductus venosus*. 16. Vena cava inferior. 17. The vena portarum. 18. The renal artery and veins. 19. The splenic artery. 20. The ovarian vessels.

B. Now, having acquired these anatomical views, let us see what is the course of the blood in the foetus. A part of this fluid, circu-

lating in the umbilical vein, is, therefore, discharged by the venous canal directly into the vena cava; another part is distributed to the liver, where it probably undergoes, as before stated, some alterations, and thence is brought back by the hepatic veins to the vena cava. Consequently, all the blood from the umbilical vein reaches the vena cava inferior either directly or indirectly. The blood contained in the latter is therefore a mixture of the sanguineous liquid, which returns from the inferior extremities of the foetus and that poured into the liver by the vena portæ, and more especially of that from the umbilical vein. This compound reaches the right auricle through the ascending vena cava, where it only mixes partially with the blood of the upper extremities, which has been brought back by the descending vena cava, because, in passing into the auricle, the ascending or inferior vena cava is directed towards the foramen of Botal, and hence its blood passes in a great measure through this opening into the left auricle, and thence into the left ventricle. By the contractions of this latter the fluid is then forced into the aorta (the heart's impetus being broken against the great curvature of this artery), and the blood passes into the vessels which arise from the arch, and is distributed through them to the head and superior extremities, a very small portion of it only reaching the descending aorta or the lower parts.

The blood, after having thus supplied the upper half of the body is collected by the veins, which, by their successive union, form the superior or the descending vena cava; the latter empties into the right auricle, where a small quantity of its blood probably mixes with that brought by the ascending cava; but much the largest part passes directly into the right ventricle, which forces it into the pulmonary artery.

This vessel sends but a trifling portion to the lungs; the rest being thrust into the ductus arteriosus, which discharges its contents into the aorta; that is to say, the blood that has contributed to the nutrition of the superior parts of the body, and has traversed the descending vena cava, the right auricle, the right ventricle, and pulmonary artery, and then has passed through the ductus arteriosus, finally mingles with the remnant of blood still existing in the descending aorta. The whole now descends to the inferior part of the latter vessel, where a small portion of it is sent through the arterial trunks to supply the inferior extremities, whilst much the largest quantity is driven into the umbilical arteries, and is carried by them back to the placenta; where, after having undergone the modifications produced by the placental respiration, it is again taken up by the radicles of the umbilical vein to once more traverse the same circuit.

c. Of the changes in the circulation after birth. As soon as the respiration becomes established* the sanguineous current takes

* It is difficult to explain the cause of the first inspiration; by some, this has been attributed to an instinctive movement of the foetus, from the "*besoin de respirer*" (necessity of respiring) experienced by it, after a separation from the placenta; but these reasons are not satisfactory to me, for the air is merely

another direction, because, on the one hand, the fluid flows towards the lungs in greater quantity; and, on the other, the placental circulation is forcibly interrupted. Below, I subjoin the results of Billard's labors, who has devoted particular attention to the modifications then observed in the organs of circulation, as they are interesting alike to the accoucheur and the medical jurist.

1. *Period of Obliteration of the Foetal Openings.*—The foetal openings are generally obliterated in the course of a week after birth, still, they may remain patent at that age; and I may add, that either the foramen of Botal or the arterial canal may continue pervious at two or even three weeks, without the child's experiencing any particular disadvantage therefrom during after life.

The umbilical arteries are usually closed on the second day; even at twenty-four hours they have already become smaller in the vicinity of the ring, and they are obliterated by the third or fourth day as far as their junction with the hypogastrics, by gradually changing into a fibrous cord; the whole process being completed in three weeks.

The umbilical vein is never obliterated till after the arteries, and the same is true of the ductus venosus; however, both are quite empty, and considerably contracted on the fourth day, and they are generally closed up by the sixth or seventh.

The arterial canal and the foramen of Botal are the last to undergo this process; but they rarely persist beyond the eighth or ninth day, although the foramen sometimes remains open much longer, being only effaced completely towards the end of the first year.

2. *Mode of Obliteration.*—If the ductus arteriosus and the umbilical arteries be examined during the progress of obliteration, their parietes will be found to grow gradually thicker; this hypertrophy is particularly observable in the arteries near the navel, as may easily be verified by making sections of them at this point; but the thickness gradually diminishes towards their origin from the iliacs, and their canal is likewise obliterated precisely in the same order of progression. Of course, the contractility of its walls will also contribute towards effecting the occlusion.

The arterial canal undergoes a similar hypertrophy and parietal retraction, which takes place in such a manner that, whilst the vessel's absolute size does not appear diminished, its orifice is greatly contracted; resembling a pipe whose fracture is quite thick, and yet the opening at its centre is of a very moderate calibre. The obliteration is therefore the immediate result of the retraction and concentric hypertrophy of the walls; nevertheless, it must not be supposed that this is the primitive cause, for if the same quantity

introduced into the lungs by an enlargement of the chest, and not, as some imagine, to fill a vacuum that never existed; now, such expansion is owing solely to the violent, jerking, spasmodic contraction of the diaphragm. A contraction caused either by the sudden impression of cold, from the difference in the media the child successively occupies, or by the artificial excitations (friction on the surface, irritation of the mucous membranes, &c.) resorted to when the infant is feeble.

of blood flowed into those vessels, such a retraction evidently could not take place; but from the very first inspiration, this fluid is driven by the contraction of the right ventricle (*vide infra*) nearly en masse into the pulmonary arteries, scarcely any of it passing by the ductus arteriosus; and, on the other hand, the very oblique angle at which the umbilical arteries pass off, satisfactorily explains why the blood that flows into them in such great abundance when it has no other outlet, no longer enters them at all, or at least only very feebly, when the establishment of respiration has completed the vascular circle of the new-born child.

But the umbilical vein, and the ductus venosus, are not obliterated in this way, and their walls exhibit no remarkable increase of thickness; for, after the cord has been cut, these vessels receive no more blood (excepting in those cases where it regurgitates from the *vena cava*), and then the walls fall in and become contiguous, just like any other canal whatever, when the liquids that have habitually traversed it are cut off; nevertheless, the umbilical vein and the ductus venosus retain their cavities free for a long time, for a large probe may easily be introduced into them; but this cannot be done in the arteries nor in the ductus arteriosus.*

The foramen of Botal is the last to disappear, although an effort at obliteration may be observed there sooner than in any other of the foetal openings: thus, the two auricles are nearly confounded in one in the early stages of intra-uterine life, and the diminution of the foramen ovale only begins to take place about the third month by the development of a semilunar valve on its inferior border; this valve, composed of a double membranous layer containing fleshy fibres in its substance, gradually rises along the margins of the opening towards the left auricle, by contracting adhesions with the circumference of the foramen, and it ultimately forms the fundus of the fossa ovalis, as also the little semilunar fold seen in the auricle. In this way the partition is completed, being merely perforated by an oblique canal occasionally found in young subjects, which also disappears after a time.

The following summary will enable the reader to appreciate the influence of those vascular modifications upon the circulation:—

Immediately after the first inspiration, and from the sole fact of the distension of the pulmonary cells, the branches of the pulmonary artery, ramifying in the mucous membrane, and contributing to the formation of their walls, are suddenly rendered permeable throughout their whole extent, and a vacuum is therefore produced, into which the blood is sent from the right ventricle; consequently, from that period the route travelled by this fluid from the right ventricle to the aorta, will be more considerable than heretofore, and the ductus arteriosus, which is thus emptied, will retract at once, and its calibre be very much diminished.

* A case of persistence of the umbilical vein in the adult, which communicated at one extremity with the *vena portæ*, and at the other with the *crural vein* through the superficial abdominal veins, is reported by M. Cruveilhier, in the 16th number of his *Pathological Anatomy*.

The right auricle, which could scarcely force all the blood that it received from the *venæ cavæ*, through the foramen of Botal, now sends the most of it into the right ventricle.

Prior to birth, the left auricle only received the blood by the foramen ovale, but it is henceforth filled with that brought through the four pulmonary veins. Moreover, the relation that existed, in the quantity of the sanguineous fluid deposited in each auricle, is changed from that time; for the right, which was distended beyond measure, now relieves itself with facility, while the left, that scarcely had any before, is filled with the blood brought by the pulmonary veins; so that it would flow from the left to the right auricle, through the foramen ovale, if the semilunar partition, which has the office of a valve, did not prevent such a movement.

BOOK IV.

PATHOLOGY OF GESTATION.

THE pathology of gestation properly comprises, in its study, all the functional derangements that may occur in the pregnant female, and all the spontaneous or accidental lesions in the ovum, sufficient to compromise the life of the child; but we shall pass over the last, as they most generally happen unperceived, or are only revealed to the physician, when too late to remedy them; in fact, all we could say, would be limited to a few general considerations of pathological anatomy, altogether foreign to the object of this work.

CHAPTER I.

DISEASES OF THE PREGNANT FEMALE.

DESORMEAUX, in his excellent article on this subject, ranges all the maladies of pregnancy under the following heads, viz., lesions of digestion, of circulation, of respiration, of the secretions and excretions, of locomotion, and of the sensorial and intellectual functions. And we propose to adopt the same order in our description.

ARTICLE I.

LESIONS OF DIGESTION.

§ 1. PTYALISM.

A profuse salivation is observed in some women during the earliest periods of gestation, but it is generally of short duration, and disappears of its own accord. In case our advice is asked on this point, we might direct any aromatic infusion whatever; though, if it obstinately continues, Desormeaux says that some candied sugar, or a little gum Arabic constantly held in the mouth, will render it less distressing.

§ 2. ANOREXIA.

The want of appetite, or the disgust for aliments, which pregnant women are so often affected with towards the end of gestation, and still more frequently at its commencement, may be referred to various causes, and consequently will present different indications for treatment. When it seems to result merely from the sympathetic relations existing between the uterus and the organs of digestion, there is little or nothing to be done, for it would be in vain to attempt removing the disgust which some patients have to certain articles of food. In general, they dislike all meats, and this is an indication, or rather an obligation, to permit the use of vegetables in such cases. Again, if at an advanced stage, the anorexia be accompanied or preceded by the phenomena of general plethora, venesection, proportioned to the general condition of the female and the stage of pregnancy, may relieve it.

In those cases which exhibit evident signs of an overloaded condition of the alimentary canal, some purgative, such as rhubarb, or even the neutral salts, may be administered. Indeed, certain authors have recommended an emetic, when there is any gastric distress; but I think practitioners ought to be very reserved in the employment of this last measure, since the shock of vomiting has often produced an abortion.

§ 3. PICA, OR MALACIA.

Pica, or malacia, frequently accompanies the affection just described. Pregnant women, like chlorotic girls, often have irregular and depraved longings for the most absurd or disgusting articles. For instance, I have known a young female to eat pepper grains, almost continually. Another, at *la Clinique*, scraped the walls to appease her cravings for chalk; and M. Dubois often relates in his lectures, the history of a young pregnant woman whose greatest pleasure consisted in eating small bits of well-charred wood. Again, they have been observed eating greedily, substances that are still more disgusting. But, unfortunately, all our persuasive efforts are useless with such monomaniacs in the majority of instances, and

consequently we must, as a general rule, grant them an indulgence, and avoid too strong an opposition, unless the coveted articles would evidently be injurious to their health.

§ 4. VOMITING.

This symptom is so common that most females are affected with it; in fact, vomiting frequently commences in the very earliest stages: whence many women, taught by their former pregnancies, recognize it as an almost certain sign of a new gestation. At other times it does not appear until towards the third or fourth month, though seldom later than that: but, it is not at all uncommon to see it reappear near the end of pregnancy in some who had been previously tormented in this way at its beginning. As an ordinary rule, the vomiting only lasts six weeks or two months, sometimes however, it extends over four or five months, rarely persisting throughout the whole term. Some females have the unenviable privilege of vomiting every time they are pregnant; others, more fortunate, pass through several gestations without feeling any digestive disorders whatever. It is a very remarkable fact (if we may rely on the testimony of numerous mothers), that the sex of the child is not wholly irrelevant to the production of this symptom, and, however ridiculous this may appear at first sight, I have heard it repeated by so many women, that I cannot refrain from believing that it, like most other popular prejudices, has some foundation.

But what is the cause of such vomitings? When they occur near term, we may justly attribute them to the pressure, to the mechanical constraint which the uterus, whose fundus reaches the epigastric region, exercises upon the stomach; but in the early stages it is much more difficult to explain this phenomenon, unless we content ourselves by referring it to the numerous sympathies existing between the uterus and the stomach; sympathies so intimate that they are manifested in certain women at every menstrual period, and even in nearly all those afflicted with a disease of the womb. Where the affection is slight, the patient only vomits when she awakens or rises in the morning; she then throws up some viscid glairy waters, variable in quantity, and mixed with a little bile if the efforts of vomiting are very severe: at other times it occurs during the day, most generally after a meal. Finally, in the most aggravated cases, the sufferer rejects immediately, or a short time after each repast, all that she had eaten; and if this state should continue for a long time, we may imagine the consequences that must result both to the mother and child. But it must not be supposed, however, that vomitings, even when prolonged and oft-repeated, are necessarily disastrous. No doubt many women waste away, but I have often satisfied myself that the leanness is not apt to be excessive, by examining females, who, according to their own expression, could retain nothing at all; and hence it is exceedingly probable that all the food taken by them is not rejected. Nevertheless, the emesis may prove so obstinate that the woman succumbs before term, from an absolute want of alimentation; for instance: Davis and Dance relate cases

where death was preceded by such an emaciation, which was always progressive and was carried to an extreme, yet no lesion was developed at the autopsy that explained their premature decease.

Sometimes the vomitings are easy and without much pain ; but at others they are preceded by such violent and long-continued retchings as to throw the patient into a state of suffering and extreme agitation ; often leaving behind them a distressing pain at the epigastrium, that is increased by pressure, and which may at first be mistaken for a symptom of gastritis, but it gradually wears away, and finally disappears some time after the vomiting has stopped. These shocks and severe strainings are felt at times in the hypogastrium, and they may give rise to abdominal pains, to true uterine contractions, or even an abortion. But in general, these vomitings are only painful and fatiguing to the patient, and should cause no serious alarm. I have never known, says Burns, vomiting dependent on pregnancy alone to have a fatal termination. Again, "I might cite," Desormeaux remarks, "examples of emesis accompanied by cruel pains and violent general spasms, yet the gestation has happily gone on to full term." At this time, I have under care a lady who has been vomiting throughout the whole period of gestation, and who has just been delivered of a daughter weighing seven pounds and three quarters.

The diagnosis is easy; for most usually the absence of any febrile action, of redness of the tongue, and of epigastric pains, will be sufficient, even when the pregnancy is doubtful, to recognize the character of the vomitings.

Treatment.—There are but few medicines that have not been proposed, at one time or another, for this affection of pregnant women : however, I shall merely bring forward those which appear to me the most efficacious.

When the emesis is slight, and only occurring in the morning, we may recommend an aromatic infusion of the lime-tree, orange-flower, common tea, &c. &c. Where it comes on after a meal during the day, it is advisable to change the order of the repasts ; for example : if it be generally more distressing after supper, the patient should sup sparingly and eat more at breakfast. Cold aliments are sometimes retained when others are rejected. Iced drinks, mineral waters, and swallowing small pieces of ice have arrested some cases of obstinate vomiting, that set at defiance the whole series of anti-spasmodics. Should it persist, notwithstanding these measures, a resort may be had to a remedy, which has often succeeded perfectly in my hands, I allude to the narcotics. About an hour before the meal, let her take one-third or one-half a grain of the aqueous extract of opium made into a pill ; but when she is constipated, it will be necessary to administer some mild purgative to counteract any action the opium may have on the large intestine.

Whenever the emesis is attended with pain and stricture at the epigastrium, leeches have been recommended over this part, though I have rarely seen their application followed by any benefit. I should prefer laudanum lotions, or the application of a cataplasm

well tinetured with this fluid. Sometimes I have sueeessfully applied a small blister to the epigastrium, and subsequently sprinkled the sixth or the third of a grain of the muriate or acetate of morphia over it.

If the vomiting oeeasions pain in the loins, or hypogastrium, in a word, if it threatens an abortion, or if the patient be plethorie, and this eondition is manifested by local or general phenomena, venesection in the arm should be resorted to, as this is one of the best measures I am aequainted with, espeeially during the last half of gestation ; and we may advantageously conjoin partial or general bathing with it.

With regard to the regimen, doubtless a mild liquid diet, eomposed of aliments that are easily digested, seems at first to possess decided advantages over all others ; but how many exceptions ! how many women reject the mildest articles—even liquids, and yet readily digest less suitable substanees ! Of course, we must respect these irregularities of the stomach.

Among the various measures recommended, but which I have never had occasion to resort to, may be mentioned the application of cups to the pit of the stomach (Mauriceau) ; of a plaster of theriaca (Sydenham) ; a few spoonfuls of Sherry wine, or even some brandy, ether, peppermint-water, the potion of Riviere, and the colombo root.

In those cases in which there was some degree of regularity in the return of the pains, and febrile action, Desormeaux has given two or three grains of the dry extraet of cinchona with suecess. Lastly, Walter and Blundell have highly extolled the use of hydrocyanic acid in the dose of one or two drops, in some mucilaginous drink, several times a day ; and I have given, benefieially, a few spoonfuls of "kirseh."

I have thus enumerated all these remedies, beeause they may be sueeessively employed in this affection. In fact, the same medine may act on one female and have no effect on another. And it must be confessed that sometimes all will fail, and we can scarcely succeed in moderating the patient's sufferings, either by really calming her distress in a measure, or by sustaining her spirits, not seeming to abandon her, but holding out the idea that each new remedy may effect some amelioration. In this way she gradually approaches towards term, or at least a period of gestation when these symptoms often disappear of themselves.

But where the vomitings continue, notwithstanding all the rational measures resorted to, the woman absolutely throwing up everything she takes, and the privation of food has reduced her to sueh a state of emaciation as to endanger life, some aeeoucheurs have advised (if her term is still remote) the production of premature labour. This operation has already been practieed, in similar cases, by several English and German accoucheurs, with full suecess, both for the mother and child. (*Merriman, Blundell, and Churchill.*)

It is very diffiult to explain these digestive disturbances ; they

evidently seem due to the sympathetic action of the uterus on the organs of digestion; but what is that action? In some females, it has been said, the stomach is more predisposed to receive such sympathies; that, in the great majority, the primary cause is located in the uterus, which is distended with much difficulty, and likewise suffers from this distension, whether at the beginning or the end of gestation, especially when the enlargement is rendered greater by the presence of twins, or of a large quantity of waters; but in such cases, would it not rather be owing to the pressure of the uterus on the stomach from the former reaching the epigastric region, and thus interfering with the functions of the latter?

Dance reports two cases, from which he feels authorized to conclude that these vomitings are often an evidence of a morbid activity in the uterine system, of an inflammation of the membranes; and consequently he advises direct antiphlogistic measures, especially in the neighborhood of the womb; but, as his opinion is founded on two cases only, which, after all, are not conclusive, it seems to me that it cannot be admitted as the rule of practice.

§ 5. CONSTIPATION.

Constipation is a very common affection in pregnant women, and it is usually attributed to the pressure of the developed uterus on the upper part of the rectum, by which not only is the calibre diminished, but its action is also paralyzed. When carried too far, it often produces anorexia or digestive disturbances, and becomes a cause of agitation and loss of sleep; and, besides, the strainings necessary to expel the hardened feces that have accumulated in the intestine, may prove a source of hemorrhage and consequent abortion.

The most proper measures for preventing and remedying this state are very nearly the same as those used at other periods of life.

The opposite condition, or the diarrhoea women are so often tormented with, may be referred to the same source.

ARTICLE II.

LESIONS OF THE CIRCULATION.

The general circulation is more active in pregnant women than in others, and this increased activity manifests itself by a greater frequency of pulse; in fact, it is often harder and more full than in the non-gravid state. The blood drawn from a vein generally exhibits a buffy coat, similar to that in the inflammatory diseases, its clot being both more voluminous and more consistent than usual; sometimes, however, it contains a great deal of serum, the clot being small, but still covered by a whitish coat. This condition, which may be considered as the normal one in gestation, is occasionally aggravated, and then certain phenomena are manifested that evidently constitute a morbid state, requiring remedial aid.

§ 1. PLETHORA.

This is without doubt the most frequent of all those troubles. It may be divided into general and local plethora, according as it is manifested by any general disorder in the circulation, or directs its force to some particular organ, most commonly the uterus. Nothing is easier, agreeably to many authors, than to explain this plethoric condition of pregnant women; thus, they say the amenorrhœa is sufficient to augment the mass of blood, but they do not reflect that if this be exceptionally true in some females, whose courses habitually flow abundantly for eight or ten days, it certainly is not so in the greater number; for taking the calculation of Lobb as a basis, and supposing the woman loses seven ounces (Troy) at each menstrual period, the blood retained during her whole pregnancy would form a mass of about five and a half pounds; now the foetus and its appendages absorb a larger quantity than this. Therefore, the plethora is not an hydraulic effect, but the result of an increase of vitality which takes place during gestation. It is not in quantity alone, but also in composition, that the blood of pregnant females undergoes important modifications. For instance, the researches of Professors Andral and Gavarret demonstrate an excess of fibrin in the latter stages, as also a remarkable tendency to assume the characteristics of inflammatory blood. They further obtained the following results by analyzing this fluid in thirty-four women who were enceinte; from the first to the end of the sixth month, the blood uniformly presented a less quantity of fibrin than the physiological standard; thus, the mean of the fibrin was only 2.5; the minimum 1.9; and its maximum 2.9. On the contrary, its mean surpassed the normal quantity in the last three months, being nearly 4; the maximum reaching 4.8; and towards the end of the last month the mean is 4.3 in 1000 parts. The fibrin thus attains its maximum about the last month, and we may presume that this quantity is sustained if not increased immediately after the delivery. Now this augmentation in the quantity of fibrin readily explains why the clot is covered after venesection by a buffy coat in most pregnant women; further, this phenomenon according to those gentlemen, should occur the more easily, as the globules in their blood often fall more or less below the usual mean; for instance, in thirty-two cases out of thirty-four examined by them, the globules were below the mean, varying in six cases from 120 to 125, and in the twenty-six others from 95 to 120; whence it appears that most of those women actually exhibited the primary symptoms of *anemia*.

This condition of the blood is therefore perfectly in consonance with that remarkable discoloration and semi-bloated aspect of the face, observed in most females as soon as they have conceived.*

* After having read the curious statements just given, the student will perhaps find them to disagree with the title of this paragraph, and possibly also with the therapeutic measures hereafter recommended; for how, indeed, can we reconcile this denomination of plethora, applied to the totality of the phenomena observed in most gravid females, with the evidences of anæmia furnished by a microscopical examination and the chemical analysis of the blood? Is it

The most common signs of general plethora are headache, somnolency, flushes of heat, vertigo, dyspnœa, depression of spirits, high-colored urine, and a full frequent pulse. However, these phenomena, which are spontaneously produced, and persist for a variable length of time in young, corpulent, robust women, who usually have a high color, may also be produced, or be greatly aggravated, by any circumstance whatever that serves to excite the patient.

Bleeding in the arm proportioned to the condition and age of the female, and the stage of pregnancy, is the remedy 'par excellence' in such cases. The symptoms of general usually precede those of local plethora, but in some instances the latter may be first developed; for often, indeed, when the general phenomena have lasted a certain length of time, they are followed by an epistaxis, hemoptysis, hematemesis, etc. Sometimes the consequences are still more disastrous, and a pulmonary or cerebral congestion, or a true apoplexy of the lungs or brain, may result from an undue negligence in not combating the precursory signs. But of all the local plethoras, that of the uterus has the strongest claims on our particular study; indeed, at every period of life man has an organ, which is, so to speak, the centre of fluxion for the time being. The brain in infancy, and the lungs in the adult, are the special viscera to which all the derangements of the organism tend; and in women the uterus is peculiarly such a centre. Thus it seldom happens that any disturbing cause whatever, any moral or physical impression, disorder or activity of circulation, can exist without the womb being sensibly impressed thereby.

To the general signs above indicated, the following are then added: the patient complains of tension or abdominal swelling, of a sensation of weight in the pelvis, groins, and upper part of the thighs; and she also suffers from pains in the kidneys and loins, and if suitable measures are not resorted to at once, the vascular congestion and consequent pressure on the uterine walls irritate the organ, slight contractions are manifested, and sometimes even a little blood escapes from the vulva, announcing an approaching miscarriage. Lastly, I have frequently known a well-marked vesical tenesmus to coincide with the other symptoms of uterine congestion. Is this, because the volume of the organ as well as its weight, in-

not probable that the profession has heretofore been in error, in attributing to this cause, what in fact is only due to an impoverishment of the blood? Because, if to these results we add the beating of the carotids, the caprices of the stomach, the digestive disorders, and the varied nervous phenomena that occur during pregnancy, and which closely resemble those so often observed in chlorotic patients, are we not irresistibly brought to the conclusion, that the chlorosis which produces them in the one case also does in the other? and consequently, that the bleeding generally recommended is more likely to augment than to diminish such disorders; and therefore should not tonics, or even the martial preparations, be preferred to it? A sufficient number of facts are still wanting to decide the question satisfactorily; but, while presenting in this work the views most generally received, we cannot conceal the effects produced on our mind by the experiments of Andral and Gavarret; and we intend verifying hereafter the practical value of their curious researches.

creased by the congestion, makes more pressure on the body and neck of the bladder? Sometimes also the foetal circulation seems to participate in the derangements of the mother's vascular system, for the movements of the child grow weaker, diminish in frequency, or even disappear altogether, and this condition, when it occurs, is of the most serious character.

However difficult it may be to explain this latter complication, it is a fact too common to permit any doubt; for the active movements of the foetus may be wholly arrested under the influence of the mother's plethoric condition. In fact, this may often very much retard the period at which those movements are habitually perceived, as their prompt reappearance after bleeding in the arm fully proves; for, not unfrequently, after the employment of this remedy, a woman who may have reached five months, or even five months and a half of her gestation, without feeling any movements whatever, immediately recognizes those peculiar sensations. A uterine congestion is particularly frequent in plethoric females, who have copious menstrual discharges; occurring in them without any appreciable cause, in the early months of gestation, and more especially at the ordinary periods of the courses. But, in women of a different habit, it does not appear until a more advanced stage, and always, then, under the influence of some moral or physical cause, whose action is easily understood. In all it may produce abortion, and therefore merits the serious attention of the accoucheur.

The remedial measures to be employed, are 1st. Bleeding in the arm, one or more times according to the particular case. In general, it is better to practice several small bleedings, of four to six ounces each, at short intervals, rather than a single copious one, and we should especially avoid carrying it so far as to produce syncope.

2d. If there are any abdominal pains, however trifling, particularly if there be some slight uterine contractions, recognizable by an intermission of the pains, and their return coinciding with a greater hardness in the uterine tumor, we must early resort to the administration of opiates; that is, after having emptied the lower part of the intestinal canal by an injection, twenty drops of Sydenham's laudanum is to be given in a small quantity of some mucilaginous fluid, and renew the dose three-quarters of an hour to an hour afterwards; then a third, if the symptoms still persist. The dose may even be increased to one hundred, one hundred and fifty, or two hundred drops, in the twenty-four hours; for the success obtained by the English physicians, and by Professor P. Dubois, who has introduced the British practice into France, fully warrants the administration of such large quantities. In fact, this remedy is truly heroic in those cases.

3d. Absolute rest, in the horizontal position; repose of mind and body; slightly acidulated cold drinks, and a rigid diet, are the accessory measures; but which, however, are too important to be neglected.

As some females experience such derangements at every menstrual period, it is prudent to prevent their recurrence. For that

purpose, they should avoid all moral and physical excitement; and they ought to remain in bed, or on a couch, not only during the time the menses usually last, but also for the three or four days preceding and following the period of their appearance.

Preventive bleedings may also be employed in the early months of gestation. A young lady, pregnant for the fourth time, informed me that in the three previous gestations, she aborted before the fourth month, and this misfortune was always followed by profuse flooding. She had a high color, was plethoric, and her courses flowed copiously. She experienced, from her own account, at each month during pregnancy, most of the symptoms just detailed, for which I recommended rest in bed, and small bleedings, repeated every month. She consented to the venesection, but was unwilling to be confined so long to bed, and she aborted at three months and a half. Again becoming pregnant six months later, and ardently desirous of being a mother, she remained in bed four months and a half from the commencement of her gestation; venesection was performed seven times during the first five months; and, thanks to these measures, she safely arrived at her full term, and was happily delivered of a living child.

Gardien and some others recommend the application of leeches to the anus, or the upper part of the thighs, in cases of uterine congestion; but I confess this appears to me dangerous advice; for, independently of their antiphlogistic action, leeches often produce a very palpable revulsive effect; indeed, they are employed for this very purpose, in amenorrhœa. I should, therefore, fear, lest their revulsive action would be felt in this case; and, if so, it would be more likely to aggravate, than to remedy the difficulty; and I may say the same of the bleeding in the foot, advised by certain authors, and, consequently, where any sanguineous emissions seem to be indicated, I prefer having recourse to venesection in the arm, as being at once both depletory and revulsive.

§ 2. ŒDEMA.

A serous infiltration of the cellular tissue is a tolerably frequent complaint, being often connected with plethora, of which, indeed, according to Chaussier, it is a variety (*pléthore sereuse*). The infiltration begins at the feet, then extends successively to the legs, thighs, and genital parts. Sometimes it extends above the abdominal members, invades the trunk and upper extrémités, and is accompanied by effusions into the large serous cavities; then constituting what Chaussier calls the serous plethora, which is attributed by him to the mechanical obstacles to respiration, and to the deficient hematosis resulting therefrom; though, when limited to the inferior extremities, it evidently results from the pressure of the gravid uterus on the iliae veins. If it is inconsiderable, nothing need be done. But the distension and size of the lower extremities are so great at times, as to cause the most cruel sufferings to the patient, and to render her walking impossible. Various purgatives, diuretics, astringent and resolvent applications have been advised for this, but,

so long as the cause persists, all these remedies will necessarily fail in effecting a cure. Perhaps the horizontal position would diminish the compression a little; but sometimes the patient cannot bear this, on account of the accompanying dyspnoea.

Where the external genital parts are swollen and greatly distended, punctures by the lancet have been recommended; and, in case of necessity, these might also be made on the abdominal limbs.

In two instances I derived great benefit from the application of compresses, saturated with cold water, which were frequently renewed, during two entire days.

Levret advises blisters between the thighs and the external labia, aided by slight punctures in the feet.

Finally, when this affection is attended with the symptoms of general plethora, a recourse must be had to venesection; but this remedy ought only to be practiced for this particular case.

A general infiltration is a very grave complication of pregnancy; for, notwithstanding the assertion of Lamothe, women sometimes perish in consequence of such swellings. Indeed, Madame La-chapelle, M. P. Dubois, and many others have observed that females afflicted with such infiltrations are much more exposed than others to puerperal convulsions, the disastrous consequences of which are well known.

§ 3. VARICES, HEMORRHOIDS.

A varicose condition of the veins in the lower extremities, the vagina, and inferior part of the rectum, is quite a common occurrence towards the latter part of gestation, though, as regards treatment, the varicose veins in the limbs only require the usual precautions to prevent their rupture; for which a methodical compression is the best remedy, and every attempt at a radical cure should be discountenanced.

Hemorrhoids, like varices, are an ordinary consequence of the uterine pressure on the hypogastric vessels; but they may likewise be frequently produced by constipation, and the attendant accumulation of hard matters in the rectum. The bleeding piles are generally less disastrous; but the others are more grave and very painful. In fact, it often happens that women affected with them, can neither stand nor walk, and they are even troubled when seated.

The first indication is to combat the costiveness, and then to assuage the pain by tepid bathing, cataplasms, and emollient and narcotic lotions, or the poplar ointment may be applied to the tumors; and where they are internal, a suppository of cocoa-butter might be introduced into the rectum. Liniments containing opium and belladonna will frequently relieve the patients; but this is all that we could prudently do under the circumstances.

When the inflammation and turgescence are very great, bleeding in the arm is advisable, as this is much preferable to the application of leeches in the immediate neighborhood of the tumor; true, the latter calm the pains temporarily, but then, in certain females, they might bring on an abortion. On this point, says Desormeaux, I

have never known the application of leeches on the tumors, or the incision of the latter to procure any durable relief.

Where the irritation from the piles seems to react on the womb, and threatens an uterine hemorrhage, M. Gendrin has derived signal advantage from cold applications around the pelvis. In those cases, says he, if the hemorrhage is imminent, we augment the activity of the topical remedies placed directly over the parts affected, by using cold baths to the breech at the same time, the temperature of which has never been lower than 12° or 15° (Centigrade, equivalent to 54° or 59° Fahr.). As to the varicose condition of the vaginal veins we shall speak more fully of it under the article *Thrombus of the Vulva*.

ARTICLE III.

LESIONS OF RESPIRATION.

Cough and dyspnœa are about the only affections claiming our examination under this title.

The dyspnœa that supervenes towards the end of pregnancy is evidently produced by the restriction of the lungs from the excessive uterine development, and the delivery alone can cure it; but sometimes it is sooner manifested in consequence of a pulmonary congestion, which must be remedied by general blood-letting, a light regimen, absolute repose in a suitable position, and loose clothing.

As to the cough, it is only dangerous as regards the pregnancy, by the violent jars sometimes given, which may produce an abortion. Indeed, all the observers who have written on the influenza, have carefully noted the frequency of this accident in women who were affected with it.

When the cough is the effect of pregnancy, it may most generally be attributed to local plethora, and then we should bleed. But when it is the symptom of a chronic malady, existing prior to gestation, the treatment will vary with the disease that produced the cough. Though, whatever may be its origin, the accoucheur should always resort to such demulcents and pectorals as are calculated to diminish its intensity.

ARTICLE IV.

§ 1. LESIONS OF THE SECRETIONS AND EXCRETIONS.

We have already pointed out the anatomical modifications which the bladder undergoes during pregnancy; but the lesions in the functions of that organ still claim our attention, for the uterus often presses on the bladder, impedes its dilatation, and places the woman under the necessity of frequently voiding her urine; sometimes the neck only is compressed, giving rise to pain and some difficulty in the emission of that liquid.

This difficulty in urinating may occur in the commencement of preg-

nancy, either when the pelvis is too large, and it permits the uterus to remain a long time down in the excavation, or on the occurrence of a prolapsus uteri, or those other displacements of this organ known as anteversion and retroversion.

Most frequently, however, this happens towards the end of gestation, either because the uterus, from being pushed down by the presenting part of the foetal head, early engages in the excavation, or because the womb is forcibly carried forwards ; in the latter case, the body of the bladder is pressed upwards, and in front by the uterus, and its neck forced against the superior margin of the symphysis pubis.

When the anteversion is well-marked, the body of the bladder forms an angle with the neck; in some cases it is even lower, whence the introduction of a catheter is then exceedingly troublesome. After all, the difficulty of urinating still persists until term, whatever we may do, for we can only alleviate it by tepid bathing, the horizontal position, and more particularly by the use of a bandage to sustain the abdomen.

Where the retention is complete, the bladder by becoming distended may increase so much in size as to reach the umbilicus, or form a hernia at the groin or perineum, and its excessive distension might produce an inflammation or even a rupture, especially during the throes of labour ; but where the neck is not altogether obliterated by the pressure, an incontinence of urine may ensue ; the fluid dribbling away drop by drop, though unfortunately that is not always the case, and the catheter must then be resorted to.

I have already said this operation is attended by difficulties under such circumstances, and when it is quite impossible to perform it, the distress may be relieved, in a measure, by pressing back the uterus from the symphysis pubis with the two fingers, and the woman should be taught to aid herself in this way during pregnancy.

In some instances, the female suffers at the latter stages a considerable smarting or pain in urinating, as sharp as if there was a stone in the bladder ; these symptoms arise from a true catarrh of the body, or at least of the neck of this organ : the urine, in fact, often contains whitish flakes of purulent matter. Such symptoms require the general antiphlogistic treatment, local bathing, emollients, and mucilaginous drinks. As a general rule, women only suffer from an incontinence of urine during the last three months, and then the delivery is the only remedy ; however, it shows itself in the early stages of gestation in certain females, being evidently produced by the pressure which the uterus (that is still located within the pelvis) makes on the neck of the bladder, and it lasts until the womb rises above the superior strait ; the symptoms, at this period, can be relieved by injections of warm water, and by the internal use of tonics.

§ 2. SEROUS EFFUSIONS.

The serous effusions into the cavities of the peritoneum and pleura, during gestation, are properly referred to lesions of secretion ; but

we shall not study them here, nor shall we speak of the discharges from the vaginalæ of pregnant women, which are merely the result of the more active vitality exhibited by all the genital organs during gestation ; and besides, they present no special therapeutic indications.

§ 3. DROPSY OF THE AMNIOS.

The amniotic liquid may sometimes augment to a very considerable quantity ; but as the normal amount is very variable, it is difficult to say above what limits it should be considered as a disease ; however, when it exceeds three or four pounds, the accumulation may be justly attributed to some morbid condition.

In the present state of our science it would be absolutely impossible to designate the cause of this singular affection, although some facts seem to militate in favor of its being produced by an inflammation of the amnios ; but this opinion requires further confirmation to be received without hesitation, for, notwithstanding Dr. Mercier claims to have seen the internal surface of the amnios covered several times by false membranes, and that membrane itself highly injected, yet other observers have not detected anything of the kind. (*Journ. Gén. de Méd.*, tom. xiv.)

Again, from the cases cited by Drs. Merriman and Lee, it would appear that a dropsy of the amnios is often associated with a morbid condition or a bad conformation of the foetus, or with a state of general infiltration on the part of the mother ; indeed, some facts would lead to the supposition, that constitutional syphilis predisposes to this disease.

In a few instances, it has seemed referable to sanguineous plethora ; but as it occurs in women of every variety of condition, constitution, and age, this cannot be considered as the fixed rule on this point. It is much more frequent in twin pregnancies, and furthermore it rarely supervenes prior to the fifth month.

In some cases, the dropsy has been preceded by all the signs of an active inflammation ; but most commonly a dull pain in the uterus, a feeling of weight about the pelvis, and a rapid growth of the organ are the only evidences of its existence. The womb speedily acquires a considerable volume, and it is more distended at the fifth or sixth month than it usually is at term. Further, the development is progressive with the quantity of liquid ; thus, the latter often amounts to five or six pints ; and Baudclocque reports a case in which thirteen pints escaped from the uterus, and another one of thirty-two pints. Certain authors have even known forty or fifty pints to exist in the amniotic cavity ! The fluid being similar in all respects to the liquor amnii.

In a case reported by Duclos, the distension of the womb was so great, although the gestation had only advanced to the seventh month, that it enlarged the abdomen beyond measure, pushed up the diaphragm, and interfered so much with the respiration and circulation that the woman's life seemed to be seriously compromised.

The physicians called in consultation, decided in favor of bring-

ing on the uterine contractions as soon as the neck showed any evidence of dilatation ; but, suffocation being imminent, M. Duclos ruptured the membranes, at first permitting a certain quantity of fluid to escape, then, by keeping his fingers in the neck, he prevented its complete evacuation ; and thus, for four times, after intervals of fifteen minutes each, he allowed a further flow, while slight pressure was made over the abdomen. In this manner, fourteen pounds were drawn off without counting what otherwise escaped. The symptoms disappeared immediately, but as the uterus did not appear capable of any other effort, and the neck offering no resistance, the latter was easily dilated, and he brought away a living infant by the forceps. The child was feeble and diminutive, and its limbs were very small. The mother recovered.

The great enlargement of the womb often provokes premature contractions and abortion. Sometimes the child is born living, but is so little developed that it cannot survive ; more frequently, it dies in the mother's womb, and is not expelled until some time after. When the embryo's death and the dropsy come on at an early stage, the dead body may fall into a deliquium and disappear in the liquid. Of course, in the latter case it would be very difficult to distinguish the dropsy of the amnios from a simple hydrometra, and the diagnosis can only be made out at the time when the fluid escapes, by an inspection of the membranous sac which had enclosed it ; but when the foetus is living, or even has died at an advanced period of intra-uterine life, the ballottement, together with the pre-existence of the signs of pregnancy, suffices to distinguish this affection from all others.

A dropsy of the amnios, which is so grave as regards the infant, rarely compromises the mother's life, or even her health, for she is merely incommoded by the excessive volume of the womb, and the consequent interference with other organs. The expulsion of the liquid is generally spontaneous ; the foetus, membranes, and placenta passing away with the waters ; whence, the cause no longer existing, the disease is completely cured, though it may return in succeeding pregnancies, as a case reported by Desormeaux clearly proves.

When the malady is once established, it is exceedingly difficult to find the proper remedies—I will not say to cure, but even to impede its course—for instance, the diuretics have usually proved of little value. Some authors, indeed, seem to have observed good effects from dry diet ; and Burns specially recommends cold bathing. But, in spite of all we can do, the affection ordinarily goes on increasing until the commencement of labour ; and in the greater number of cases, there is nothing to be done except to await this event. However, if the uterine tumor be of excessive size, more especially should the dropsy of the amnios be complicated with ascites and a general infiltration, and the patient's life be endangered by the obstructions to the hematosis, an evacuation of the waters should be determined upon, by rupturing the membranes. For this purpose, were the neck completely obliterated, it would be necessary to make

a puncture by the vagina, near the uterine orifice. Camper and Scarpa advise puncturing between the umbilicus and pubis, but I believe there is less danger of inflammation from the vaginal operation.

A remarkable circumstance was pointed out by Bunsen and Kill, and of which I also have seen an example, namely, a hydroptic condition of the foetus, which at one time was hydrocephalic, and at others had ascites.

The same authors have also frequently observed that the placenta then had an excessive volume. Thus, in a case reported by Kill, where the extreme distension of the uterus caused an abortion at the sixth month of pregnancy, the placenta's circumference was one-third larger, and twice as thick as an ordinary one. The color was pale, its tissue spongy, and, by dividing it, the vessels which ramified therein were found to nearly equal the umbilical arteries and vein in volume. The foetal abdomen contained a large quantity of liquid. The liver was very large, occupying almost the whole abdominal cavity; its structure was normal and without any traces of swelling, but the vessels were highly developed. The volume of the liver is connected, according to the author quoted, with excessive placental development, whose vessels, being vastly enlarged, must necessarily send more blood by the umbilical vein (*Churchill*, page 50).

§ 4. HYDRORRHœA. (*The False Waters.*)

The Germans have given this name to those discharges of water that occur in the course of the gestation, but which, in general, are neither preceded nor followed by any uterine contractions; their nature is such as to interfere but slightly with the pregnancy, the latter advancing as usual to term, and at the accouchement the bag of waters is regularly formed.

This affection is much more common in the latter months than at the earlier stages. Again, the frequency of such discharges, and the quantity of water lost each time, are exceedingly variable in different cases. Sometimes the liquid comes away in gushes, at others drop by drop; but the amount may increase in an incredible manner, and the loss may occur but once, or be renewed frequently. Further, the intervals of its appearance are very irregular, and lasting a long time when it does come on, during which, any mental emotions or bodily excitement singularly influence the profuseness of the discharge. On the other hand, it augments in quantity during the most perfect quietude, as, for instance, at night during sleep. The cause of this singular affection can rarely be ascertained.

Most generally, the female enjoys her usual health before the discharge comes on, when she unexpectedly finds herself wet, the fluid escaping drop after drop, or else she hears the peculiar sound caused by the sudden irruption of a considerable quantity of the waters. In most cases, she suffers no pain either pending or after this discharge; though it may happen that a too rapid depletion of the uterus, and the consequent parietal retraction, may bring on

some slight uterine contractions; but if the patient then keeps perfectly still, they soon disappear, and everything resumes its natural order again. In color, the discharged water is usually a little yellowish, very limpid, and at times tinged with blood, leaving stains upon the linen, and having a well-marked spermatic odor.

Should the hydrorrhœa be attended with the uterine pains, it would be an evidence of an approaching abortion; and some accoucheurs, supposing the membranes had been ruptured, have been known under such circumstances to use every effort to accelerate and to terminate a labour which really had not commenced, and which, without their interference, would not have occurred before the ordinary period.

These fluids, although having no relation in their seat to the liquor amnii, have, however, been called the *false waters*, so as to distinguish them from those which escape after the membranes are ruptured in labour.

Various opinions have been advanced as to the nature and seat of these false waters; thus, for instance, certain accoucheurs have supposed that they were contained between the chorion and the amnios, and their escape is due to a laceration of the chorion; others, that they are owing to the rupture of an hydatid, lodged either in the cavity or the neck of the uterus (Boehmer, Rœdcrer). Again, Baudelocque was of the opinion that it resulted from the transudation of the liquor amnii through the membranes. Some others explain it by invoking an oedematous condition and an infiltration of the uterine cellular tissue; and lastly, Mauriceau, Camper, and M. Capuron, have supposed that these waters proceed from the interior of the amnios; for, in certain cases, they say, the membranes may yield at a point quite distant from the neck, and the superabundance of this fluid will then gradually drain away, though still an abortion may not occur. But it is an easy matter to refute all these opinions by recalling the fact of the frequency and abundance of the discharges, which often come away in large quantities; and as regards the opinion of Mauriceau, that is nothing more than a mere hypothesis; for no one has ever yet remarked that the "waters" at term were less copious than usual, in those women who had lost the false waters several times during pregnancy; and, besides, the most careful examination of the membranes after delivery has never shown any marks of laceration in any case.

It is much more probable that the fluid which thus escapes in the course of the gestation, sometimes a few days only before term, had accumulated between the internal uterine surface and some portion of the membranes (variable in extent) that were detached. This is the view advocated by Nægèle, and it has been lately reproduced by one of his "*élèves*," in a thesis sustained at Heidelberg, from which I have derived most of these details. That is to say, the fluid secreted by the internal surface of the organ gradually detaches the membranes, thereby forming a pouch for itself until its constantly increasing quantity succeeds in separating them as far as the neck, when an irruption of the liquid takes place.

Now, if we admit with Professor Burdach, that an exhalation takes place from the internal surface of the uterus, which, by transuding through the membranes, reaches the amniotic cavity, and thereby contributes to the nutrition of the foetus during the greater part of the intra-uterine life, it would be easy to explain this abnormal accumulation of fluids, either by an excess of secretion or an arrest of transudation. This may also be explained by supposing the secretion continues beyond the ordinary term, and the liquid is obliged to create a cavity or a kind of reservoir for itself by detaching the membranes to a certain extent. Perhaps it might be further admitted that the cavity of the *caduca*, which usually exists till the third month of gestation, and whose walls, according to Velpeau, are never fused into each other, may persist longer than usual; that in some rare cases it becomes the receptacle of a considerable accumulation of fluid, and the source of those discharges manifested at different periods. This view, which I believe is new, certainly appears very plausible.

Generally speaking, this is not a serious affection; nevertheless, if frequently repeated, it might bring on premature contractions.

The treatment is very simple. The patient must maintain the most perfect rest, avoiding all moral and physical excitement; and if the discharge is accompanied by any evidences of general or local plethora, these symptoms must be promptly met by the appropriate measures.

ARTICLE V.

LESIONS OF LOCOMOTION.

§ 1. RELAXATION OF THE PELVIC ARTICULATIONS.

The question has long been agitated whether the ligaments which unite the bones of the pelvis are ever softened, and whether the articulations are movable. Ambrose Paré, himself, that great surgical luminary, did not adopt the opinion of Hippocrates until after Severin Pineau made a dissection, in 1569, of a woman recently delivered, in his presence. But, at the present day, this question is determined by a very great number of cases, and it is now generally admitted that a *ramollissement* of the symphyses actually occurs in most females during gestation.

This softening may be, and generally is, slight; though it might be carried to so great an extent as to permit a considerable separation between the articular surfaces, constituting then a true pathological alteration; for instance, Hunter, Morgagni, and some others, cite instances where the relaxation was such that the pubes could be drawn more than an inch apart.

In our present knowledge on the subject, it is impossible to explain the cause of this softening; for, when trifling, it generally escapes the notice both of the woman and her physician; but, if well marked, a separation of the bones takes place as just stated. Besides, the

authors are not harmonious as to the manner in which the separation is produced; since, according to some, the cartilages become soft and thickened by the liquids that penetrate them, acting like a piece of prepared sponge placed between two bones to absorb the effused fluids; whilst, agreeably to others, they resemble the roots of the ivy, which insinuate themselves into the little crevices between the stones of a wall, and finally overturn the whole. Louis thinks they act more like dry and porous wooden wedges placed in the fissures of a rock, which, by imbibing moisture, swell up and ultimately split the rock—or like the polypi in the nasal fossæ and frontal or maxillary sinuses.

These relaxations are announced by pain in the parts corresponding to the symphysis, which pain is particularly excited by any motions of the inferior extremities, such as walking, standing, and also by pressure on the joints. When standing, the patient is conscious of the sacrum's movement between the ilia; she feels as if she were about to sink down, that her trunk was going to fall between the thighs, and her progression becomes more and more painful, difficult, and at last impossible, without extraneous support. Not unfrequently the mobility may then be detected by a crepitation or a sensible rustling, if the inferior extremities or bones of the pelvis be forcibly moved about.

This relaxation may, according to Baudelocque, oppose the spontaneous termination of the labour, by destroying the point *d'appui* which the abdominal muscles derive from the bones of the pelvis; and perhaps also the distress, produced by the head's engaging, forces the woman to restrain the pains as much as possible; though, on the other hand, from the observations of Desormeaux, Smellie, etc., we learn that this circumstance, so far from being a cause of dystocia, has actually permitted a spontaneous delivery in some cases, where the disproportion between the head's size and the dimensions of the pelvis would have otherwise rendered it impossible. But a cessation of these pains, and a perfect consolidation may not take place under three, six, or eight months, or even years after the accouchement; some facts even prove that the relaxation of the symphyses may last throughout life, notwithstanding the most prudent measures are duly resorted to.

Again, an inflammation, suppuration, and destruction of the cartilages, and a caries in the osseous surfaces, together with all the general symptoms that accompany them, may result therefrom; however, an ankylosis may still take place, notwithstanding this alteration in the bony structure.

When a relaxation in the symphyses is detected, the woman must be directed to observe the most absolute rest, and any inflammatory symptoms should be met by the appropriate means; in their absence, we may apply gentle pressure around the pelvis, and make use of some topical applications, general and local tonics, and some astringent and resolvent lotions. After the total disappearance of the lochia, Desormeaux highly extols the employment of douches, sea-bathing, a good diet of nutritive articles, the Spa and Seltzer waters, wearing

flannel next to the skin, and dry frictions. These measures should be continued for a long time, and even when convalescence is fully established, the greatest possible care must be exercised in rising, walking, etc.

§ 2. THE DISPOSITION TO FALLING.

Among the most common causes of falling, may be reckoned a prominence of the abdomen (which prevents the woman from seeing obstacles that might make her stumble), the unequal division of the body's weight, the rapid augmentation of this weight, and the posture which females are obliged to maintain, so as to preserve their equilibrium; consequently, the influence of these predispositions can only be obviated by great attention and prudence on her part.

ARTICLE VI.

LESIONS OF INNERVATION.

I shall pass over those various functional disorders, so often met with in the intellectual and sensorial faculties of pregnant women, which have been designated by the title of *puerperal mania*; and I have but a few words to say concerning the vertigos, the dimness of vision, and the faintings, that are so frequent in gestation.

These affections may arise, either from a too great nervous susceptibility, or from plethora; and of course, in the latter case, venesection is the best remedy. But frequently, the general signs of plethora are wholly wanting; thus, for instance, some delicate nervous women are subject to these faintings, from the most trifling cause, when they are enceinte; for any strong moral impulses, such as joy, or anger, and sometimes even an odor that is a little too penetrating, or the sight of an unpleasant object or person, may give rise to this condition. In fact, Gardien relates an instance, where the simple movements of the child produced swoonings; and I have attended a lady who was sick three or four times a week, during the second, third, and fourth months of her gestation, without any satisfactory cause being discovered for it.

Ordinarily, the syncope attacks the woman when standing, and she at once experiences a ringing in her ears, vertigo, dimness of vision, weakness in the knees, and she has scarcely time to sit down, before she faints away. Some females, however, are warned of the attack by the occurrence of yawnings, and a sensation of heat in the precordial region; soon after, the extremities become cold, the face grows pallid and is covered with a cold sweat; the senses and intellectual faculties are almost lost, the pulse and respiration have nearly ceased, though a total loss of the intelligence and sensibility is very rare. As to myself, I have never seen any woman in this latter state, for nearly all those whom I have carefully questioned on the subject, have stated that they had a confused idea of what was passing around them; and therefore, if there really be any in-

stances of a complete abolition of the faculties, they certainly are not so frequent as the authors would have us believe.

While the syncope lasts, we should employ the ordinary means, such as ammonia, vinegar, cold water, etc. etc. The tonics combined with antispasmodics have been recommended for its prevention; for instance, Van Swieten highly extols the use of orange-peel with canella, or still better, lemon-rind and canella, in the proportion of two or three drachms to three pounds of sherry wine, of which three or four tablespoonfuls are to be taken daily. Chambon has employed an infusion of peach blossoms with success. As to the convulsions of pregnant women, we shall speak of them in the fourth part of this work; and shall likewise refer to the same division our remarks on hemorrhage occurring in the course of gestation, as we prefer studying these maladies in all the different stages of the puerperal condition at the same time. But before closing this article, we wish to say one word about a very singular affection; I allude to the excessive itching which manifests itself in the early periods of pregnancy, and is located in the external genital organs. This annoyance was so insupportable in a young married lady under my care, that she could not refrain from continual scratching, and the general irritation resulting therefrom almost threw her into convulsive movements.

In another instance, a young girl, who wished to conceal her pregnancy, was so tormented by this disease, that it was absolutely impossible to hide her distress from the observation of her family; and when I examined her, I found the internal face of the labia externa, and the nymphæ, both swollen and inflamed from the constant scratching; the nymphæ on the right side had been so long, and so strongly dragged upon, that it had acquired twice the usual length at least. Generally speaking, the use of frequent bathing, and of the vegeto-mineral lotions applied five or six times a day, will calm the itchings; and as it is often greatly aggravated by walking, perfect rest is of course indicated. Some advantage is often to be derived from a fine compress dipped in oil of sweet almonds, and then placed in the vulvar fissure; or still better, if the compress be soaked in lead water.

Dewees states that he examined a young lady who complained of this excessive itching in the genital parts, and he found the internal face of the vulva, as also the inferior part of the vagina covered by numerous aphthæ; and that the application of a strong solution of borax, four or five times a day, caused them all to disappear in the course of twenty-four hours.

CHAPTER II.

OF DISPLACEMENTS OF THE UTERUS.

(CONSIDERED IN RELATION TO THE ACCIDENTS THEY MAY GIVE RISE TO DURING PREGNANCY.)

ARTICLE I.

OF PROLAPSUS UTERI.

WE have already seen, in studying the situation of the uterus at the different periods of gestation, that this organ sinks lower down in the excavation at first, and its orifice approaches the vulva. Now this first degree of depression may be considered as physiological, but it cannot pass beyond that without giving rise to some accident or other. Hence, laying aside all causes foreign to pregnancy, the uterus descends the more in the earlier months of gestation in proportion to the larger size of the pelvis; and as the ligaments are the more relaxed then, in some women it rests on the floor of the basin, whilst in others, the neck, or even the body may cross the vulva and become visible externally. And as a necessary consequence, the symptoms resulting from this displacement will vary in intensity, according to the degree of the latter and the period of its occurrence.

When the pelvis is too large, and this excess of amplitude affects the excavation particularly, the straits meanwhile retaining their normal dimensions, the uterus continues in the lesser basin much longer than it usually does in well-formed women. The enlarged womb then incommodes the neighboring parts by its bulk, by pressing on and irritating the bladder and rectum; the patient experiences a sensation of weight about the anus, and painful draggings about the groins, umbilicus, and loins; and a discharge, which is somewhat fetid and variable in its quantity, is soon established. The woman can neither stand nor walk without inconvenience, and she insensibly falls away into a state of marasmus. When the gestation is more advanced, and the womb increased in size, or even if less voluminous, but more depressed, the symptoms, such as a complete retention of the urine, a very obstinate constipation, etc., are still worse; finally, the impression of the uterus on other organs may react on itself, and the consequent irritation thus prove a cause of abortion.

When the retention of the urine is complete, either the catheter should be at once resorted to, or the womb be pressed up by one or two fingers previously introduced into the vagina; but even this assistance will not be necessary, if the woman lies down and elevates

her thighs considerably whenever she wants to urinate. All these symptoms, however, disappear about the fifth month, when the uterus, on account of its great development, can no longer remain in the excavation, and therefore rises above the superior strait.

In women who have had a falling of the womb before impregnation, there is reason to fear that it may persist and augment during the first three or four months of gestation, in consequence of the great laxity of the ligaments; and it is therefore prudent to advise such persons to keep the horizontal position during all this time, and not to permit them to get up until after the fifth month; and then, after the delivery, they should again remain in bed six weeks or two months at least; for by such precautions, not only may the patient escape the dangers attendant on a prolapsus uteri during the earlier periods, but sometimes even a radical cure of the disease she had before the gestation took place may be effected.

ARTICLE II.

OF RETROVERSION AND ANTEVERSION.

The mobility of the uterus in the pelvis, which is still observable in the early stages of pregnancy, notwithstanding its augmentation in volume, exposes it to another variety of displacement that is not so common as the preceding, but is more disastrous in its consequences. Thus, in some instances, the womb seems to execute a see-saw movement, by which its long vertical axis is brought into a nearly horizontal line in the excavation, in such a way that the fundus remains either a little more elevated, or else somewhat more depressed than the neck; and this displacement is what is called *retroversion*, when the fundus uteri is carried backwards into the hollow of the sacrum, and *anteversion* when it is directed towards the symphysis pubis. These two varieties may occur in different degrees; but the displacement will be much more considerable in retroversion than in anteversion, from the anterior concavity of the sacrum; and the former is also more frequent and serious than the latter.

This accident generally takes place some time during the first three or four months, more usually in the third, according to Nægèle. Smellie, however, has observed a case of it at the fifth month. It may either come on slowly, or take place suddenly: in the former case, it seems due to the slight, though continuous pressure, which the viscera make on the fundus uteri, and on its anterior or posterior part, according to the primitive obliquity of the organ; whence this same pressure may sometimes produce a retroversion, and at others an anteversion. The following is a case in point: A woman, says M. Martin, of Lyons, was taken in her third month, after a violent straining effort, with pains, accompanied by loss of blood; at first, the os tincæ was found in the *centre* of the vagina; but the patient renewed her efforts, and then the uterus became completely re-

troverted—that is, the neck was placed behind the pubis, and a little to the right, and the fundus of the organ rested against the sacrum. In this instance, the retroversion evidently resulted from the conjoint influence of the uterine contractions, and the expulsive efforts of the abdominal muscles. (Martin, *Mémoires*, p. 142.)

In the latter case, a similar effect is produced by the same mechanism, only a more vigorous and energetic impulsion is then requisite; and such an impulsion is usually given by a rapid, violent contraction of the muscles; as, for instance, after a severe retching, or vomiting, or after the strainings at stool, in women who are habitually constipated, or in urinating, in cases of *retentio urinæ*, the womb is often found displaced.

M. Moreau relates an instance of a woman who lifted a weight of fifty pounds, for the purpose of placing it on the balance, when she was immediately attacked by pains in the hypogastrium, vomiting, syncope, etc.; and, on his arrival, he found the uterus completely turned backwards; but all these symptoms disappeared immediately after the reduction was effected. In fact, a fall backwards, or blows, or any strong pressure below the navel, have very frequently caused the same result. (Nægèle.) And in one of Hunter's cases, the retroversion appeared soon after a severe fright.

Where the displacement is slowly effected, the woman is but little incommoded at first; and the necessity for reduction is only apparent after it has acquired a considerable extent. Originally, there are only some painful dragging sensations in the groins and lumbar regions; a feeling of weight and pressure on the neck of the bladder; some vesical tenesmus, and a little difficulty in the emission of urine. But when the uterus attains a certain degree of development, all these phenomena increase, and we are then obliged to interpose the resources of our art; for when matters reach this state, the womb becomes wedged, as it were, in the middle of the pelvis, and even more firmly so afterwards, because its volume augments rapidly; for not only does the fetus continue its growth, but also the uterine walls become engorged, tumefied, and inflamed, and the symptoms caused by this inflammation are added to those previously existing; and, further, as the space then occupied and filled up by the uterus is larger than the superior strait, the reduction becomes very difficult, not to say impossible. Indeed, Hunter relates a case in which the reduction could not be made, and the woman died in consequence; and at the autopsical examination it was found necessary to cut through the symphysis, in order to disengage the matrix from the excavation.

When the displacement takes place suddenly, all these symptoms are speedily manifested, and should it happen at an early stage, they are shortly carried to the highest degree, or even may soon prove fatal, for their persistence may give rise to so great a distension of the bladder, that its rupture might be thereby produced. Again, the accumulation of fecal matters in the intestine, occasions so imperious a feeling of tenesmus, that the female gives way to the most immoderate strainings; and the pain caused by the displaced and

inflamed uterus, may create a convulsive agitation of the abdominal muscles and the vaginal walls, resulting in a rupture of the vagina, and an escape of the fundus of the uterus from the vulva; as happened in the case communicated to M. Dubois, by M. Mayor.

The vaginal examination, in such cases, will enable us to detect the particular variety of displacement which causes the symptoms, for the finger encounters a tumor just within the vagina that fills the whole excavation, which is either the anterior or the posterior surface of the womb, according to whether an anteversion or a retroversion exists; in the latter case, the neck will be forcibly thrown forward and the body behind; but, in the other, we would find the neck in the hollow of the sacrum, whilst the body rested against the symphysis pubis. The displacement is never very great in anteversion; but, in the other variety, the neck will be found very near the urethra, or even close up to the fundus vesicæ; or, indeed, directed quite upwards, according to the degree of retroversion. Sometimes, however, the neck is very accessible to the touch, although the retroversion is carried to the greatest extent. This is owing to the fact of the cervix being bent round on the body, like the beak of a retort; and it is these two conditions which have been described by Mad. Boivin, under the names of the *anteflexion* and the *retroflexion* of the womb.

In retroversion, a rounded tumor, varying in size with the volume of the displaced organ, is found in the vagina. This tumor spreads out more behind than in front, whereby the posterior vaginal wall is depressed whilst the anterior is distended and elevated. Sometimes the perineum is prominent, and the vulva swollen; the rectum is pressed down and almost obliterated by the tumefied organ; and the anus often dilated and distorted outwards.

A particular variety of retroversion has recently been described by M. Martin, of Lyons, in which the os tincæ protrudes from the vulva, and the fundus uteri is pushed to the side of the sacrum; the uterine neck, being curved like the spout of an ewer, is situated below and a little in front of the pubis, the body of the organ is retained in the sacral excavation, and it lies close to the perineum. But, after carefully reading his description, I do not think it can be justly considered as a new example of retroversion. I believe it was merely a falling of the womb, which had existed prior to pregnancy, and had been aggravated by this latter condition; there was at the same time an anteflexion of the neck, which explains how the curve in the latter, described by M. Martin, might be formed below and in front of the pubis, from the depressed body forcing it beyond the vulva.

A retroversion could scarcely be confounded with simple prolapsus; for, in the former, the vaginal wall is always situated between the finger and the tumor, and the neck is high up behind the pubis, whilst, in a prolapsus, the cervix is always the most dependent part, and the tumor can be perfectly isolated from the vagina; in the latter case, the reduction is generally easy, but it is usually quite difficult, sometimes even impossible, in the former (retroversion).

Further, the symptoms of a retroversion are ordinarily much more serious than those of prolapsus.

As a general rule, the prognosis in these displacements is very grave; it varies, however, with the period of pregnancy, the volume of the uterus, the alteration in the neighboring parts, and the violence of the attendant symptoms.

Ceteris paribus, a retroversion is usually more unfavorable than an anteversion; because, in retroversion, the constipation and retention of urine, which thus far have been considered as comparatively unimportant, soon become aggravating circumstances of the disease. In fact, the bladder can only enlarge and ascend up into the abdominal cavity, by pushing the uterine neck upwards and towards the front; and hence, its body acting on the uterus by its size and weight, necessarily increases the displacement; besides, the stercoceous matters accumulated in the rectum, above the part in contact with the fundus uteri, act in a similar manner; and, again, all the woman's expulsive efforts have a constant tendency to further depress the fundus, after the displacement has once commenced. While in anteversion, on the contrary, all the causes just enumerated operate in a favorable manner. For instance, the distended bladder constantly has a tendency to press back the body of the womb, which is then carried forwards; and the accumulated matters of the large intestine pressing from above downwards on the posterior part of the neck, contribute to the same end.

Treatment.—After having emptied the bladder and rectum, and combated the inflammatory symptoms by the appropriate means, the accoucheur should proceed at once to reduce the uterus to its natural position, and secure it there. The best position for the female to assume is one in which all the muscles are thrown into a state of relaxation, when two fingers are to be introduced in the vagina, with which the body is first to be pushed up, and then the index is hooked over the neck so as to depress it.

The reduction may sometimes be effected on a single trial, but more often we are compelled to repeat the attempt after an interval of a few minutes; and just at the instant of the womb's resuming its ordinary position, a noise is heard, in some instances, like the click of a spring. It must not be supposed, however, that this operation is always an easy one. For the difficulty in using the catheter, so often experienced, the impossibility of emptying the rectum, the voluminous tumor formed behind the uterus by the feces collecting in the sigmoid flexure of the colon, the violent strainings made by the patient under such circumstances, and the size of the tumor, and its adhesions to surrounding parts, are so many embarrassing circumstances to the practitioner. For, although it is very seldom that we cannot succeed in introducing the catheter, by time and patience, yet, in some cases, this has been found altogether impossible; indeed, much prudence is requisite in the measures then adopted, and if they all prove useless, a moderate pressure made over the hypogastrium may, perhaps, slowly compress the bladder, and thus make the woman urinate, so to speak, by exudation.

Sometimes the fundus of the retroverted uterus compresses the rectum so firmly that we cannot throw an injection into the large intestine, even by using a long gum elastic tube; and, therefore, if the palpation and the abdominal percussion lead us to suspect a considerable accumulation of fecal matters in the descending colon, we should exhibit purgatives by the mouth. Again, the necessary introduction of the hand into the vagina, to effect the reduction, is at times so painful to the female, that, notwithstanding all persuasions to the contrary, she gives way to the most violent bearing-down efforts, which neutralize those of the operator. If baths, or the emollient and narcotic injections should not assuage this acute sensibility, I would not hesitate about following the advice of Dewees, and bleed *ad deliquium animi*.

The abnormal adhesions that are occasionally established between the uterus and adjacent parts, will certainly add another to the serious difficulties just mentioned, but even this must not be abandoned in despair; thus, for instance, Amussat reports a case where he distinctly felt some bridles in the bottom of the vagina and to the left of the tumor, into which he could hook the forefinger, but after a careful examination he derived the conviction that the uterus was free on the right side. He then renewed his attempts, by acting in such a way as to turn the uterus from the opposite side towards that where the adhesions existed, that is, from right to left, and he thereby succeeded in replacing the organ in its natural position. But if, after having adopted all suitable precautions, the simple procedure just described should not succeed, one of the following plans should then be resorted to; namely, to act simultaneously by the vagina and rectum, as some have advised; but the most simple plan, however, is that of M. Evrat, quoted by M. Moreau, as follows: The woman must lie upon her side, and the accoucheur then takes a rod eight or ten inches long, covered at one end by a tampon of linen smeared over with some fatty matter, which he introduces into the rectum so as to press (through the recto-vaginal septum) the fundus uteri from below upwards, whilst the two fingers passed into the vagina, hook the neck and simultaneously draw it downwards and backwards. The force necessary for this reduction is very variable, though in effecting it we need not be restrained by the fear of producing an abortion, for, even if this were to result from such efforts, the dangers to the mother would be far less than from the continuance of the retroversion. In a case of this kind, M. Halpin, after having emptied the bladder and endeavored unsuccessfully to reduce the uterus, came to the conclusion that the only mode of curing the patient was by the employment of an instrument that would bear equally on all parts of the displaced womb; and he imagined that the pelvis could be filled up with a bladder, and thus all the contained organs be pressed up together into the abdomen. With this view, he placed an empty one between the fundus uteri and the rectum, and then, by cautiously distending it, he actually succeeded in pushing the fundus upwards. (*Archiv. Gén.*, Sept. 1840, page 88.)

In an obstinate case, we might resort to a procedure recently employed by Amussat, with a prospect of success; that is, to place the female in the position for operating for stone, and then introduce one or two fingers into the rectum, and gently press up the uterine tumor by following the concavity of the sacrum, at first directly upwards, and then alternating from right to left and left to right, so as to raise the whole surface of the uterus; but if the finger or fingers placed in the rectum cannot reach so high, the thumb should be put into the vagina so as to elevate the perineum, in order that the former may penetrate still further; and, lastly, to get higher yet, an assistant might press against the elbow, or the accoucheur himself could sustain it with his own thigh or body. M. Amussat declares that he has twice succeeded in this manner in making a reduction, that had previously been ineffectually tried by several other practitioners.

Finally, what is to be done where the reduction is impossible? Abandon the patient to the resources of nature, says Merriman; but would not that devote her to a certain death, in case the inflammatory phenomena did not determine an abortion? and since a miscarriage is inevitable under the most fortunate circumstances, would it not be advisable to bring it on, rather than to leave the patient exposed for a long time to the dangers which threaten her? Indeed, most physicians are of this opinion, and I should not hesitate, therefore, to rupture the membranes by a sound passed through the neck of the womb. But, sometimes, the neck is so high up that it is wholly inaccessible; and then, a puncture of the uterus itself must be resorted to. This latter operation has been performed both by the vagina and by the rectum, but I should think the first preferable. It is, without any doubt, a dernier resort, but it ought always to be chosen rather than the symphysiotomy recommended by Gardien, and some other accoucheurs.

After the reduction (when that has been possible), the patient must remain in the horizontal position until towards the sixth month of pregnancy, and must carefully avoid all straining, whether in urinating or at stool. These simple precautions are all-sufficient, and generally render the application of a pessary useless; which latter, however, Baudelocque considers indispensable in most cases. Occasionally, the incontinence of urine, brought on by the pressure which the neck of the bladder has suffered from the neck or fundus uteri, may still continue some time after the reduction; and then, if the ordinary simple means do not cause its disappearance, we may resort to the warm mineral waters of Cauterets, Barèges, or Balaruc; to frictions with the tincture of cantharides, and blisters on the hypogastrium, together with tonics and astringents administered internally.

ARTICLE III.

UTERINE OBLIQUITIES.

In giving the physiological history of the phenomena of pregnancy, we had occasion to speak of the uterine obliquities, and we then pointed out their causes when occurring during gestation, and therefore need only observe now, that the anterior obliquity is sometimes so well marked that the uterus seems in certain cases to project altogether beyond the abdominal circumference; the belly then really bags out. However, this is a trifling inconvenience, only requiring the application of some abdominal bandage. But, as this is not the place to speak of the unfavorable influence that the uterine obliquities may have on the progress of labour, we refer for fuller details to the article on *Artificial Delivery*.

Lastly, as hemorrhages, convulsions, thrombus of the vulva, and rupture of the uterus are common to all periods of the puerperal state, we shall treat of them hereafter under special heads.

CHAPTER III.

OF ABORTION.

THE term abortion has been applied to the expulsion of the foetus from the womb, where this occurs at a period of pregnancy when the product of conception is not yet viable; that is to say, an abortion may take place at any time between the commencement of pregnancy and the end of the sixth month,* although the ancients applied the term *effluxio* to this accident if it happened before the seventh day.

In a recent and a very remarkable article by M. Guillemot, this author admits three varieties of abortion, founded on the period of its occurrence: thus, *ovular* abortion is the title he gives when it takes place before the twentieth day—*embryonic* if prior to the third month, and *fœtal* from the latter date up to the sixth month of gestation.

Persons out of the profession, further designate abortion under the names of *fausse couche* (miscarriage) and *blessure*. In general, they give the former term when the abortion is spontaneous, and the latter, when it is brought on by some accident.

* We place the period of viability at the *seventh* month, though well aware that some cases have been reported where foetuses born at six or five, or even four months, have lived; but those instances, some of which have not all the authenticity desirable, are too rare to invalidate the general law.

Abortions are much more frequent in the first two or three months than at any other period ; for the feeble adhesions then found between the caduca and the internal uterine surface, and the cavity still existing between the chorion and the reflected layer of this same caduca, sufficiently explain the frequency of hemorrhage, and consequently that of abortion in the early months. In making this remark, I am not ignorant that Madame Lachapelle has given a different view, but it was because her position at the Maternity rarely furnished her with opportunities of observing abortions prior to the fourth or fifth month, for females do not usually go to the hospitals on account of the miscarriages of the first five or six weeks of gestation ; and though other persons have since adopted her opinion, it is doubtless owing to the difficulty of diagnosis, and to the errors of females themselves, who, supposing they have only a simple retardation of the menses, allow an abortion to pass away in the early stages unperceived.

Morgagni and Desormeaux supposed that abortions of foetuses belonging to the female sex are more numerous than males, and I do not know whether the vulgar opinion opposed to this is true or false ; but certain it is, that at term the boys exceed the girls in the proportion of sixteen to fifteen, which would seem to prove that female abortions are the most numerous ; and besides, it is possible, that the difficulty of distinguishing the sex in the earlier periods of intra-uterine life may have had some influence in creating the popular error.

The history of abortion evidently includes the study of the causes producing it, the symptoms and consequences which may arise, the signs by which it may be detected, and the most suitable indications for preventing or combating it ; and we shall now proceed to their separate and successive consideration.

ARTICLE I.

CAUSES.

Considered in relation to its determining causes, abortion may be divided into the *spontaneous* and *accidental*.

The term *provoked* has also been used, where this misfortune has resulted either from criminal efforts, or from the measures adopted by the scientific physician with a laudable object.

The causes of *spontaneous* abortion may arise from the constitution and general health of the mother, from diseases of the ovum, and from the condition of the uterus and its appendages : thus, women of a plethoric habit, and having copious menstrual discharges, are greatly exposed to abortion during the early months of gestation ; in fact, we have already alluded to those hemorrhagic molimens that appear in them at every monthly period. Again, nervous or very irritable women, those who are strongly affected by moral impressions, such as anger, chagrin, &c. ; females of a sedentary habit

who are always shut up in the shops, as well as those that follow an indolent life, passing their time at balls or soireés, and in light reading, also abort very frequently; moreover, the surrounding atmospheric conditions are not wholly without an influence over the production of abortion; in fact, we may refer to this cause those epidemical miscarriages spoken of by most authors. Mountainous countries, where the air is bleak, are considered as being favorable to their production; for, agreeably to the report of Saucerotte, the women inhabiting the summit of the Vosges are very subject to abortion, and they are in the constant habit of descending into the adjacent plains to avoid this accident.

All acute diseases occurring in the course of pregnancy, the abdominal or thoracic affections, and recent maladies of the skin often produce a miscarriage. Syphilis (where the mother may be affected with it) has the most disastrous influence over the progress of gestation, and the mercurial treatment even does not always prevent it; still worse, according to some writers, the administration of mercury will add to the chances of the foetus' death, and therefore it is more prudent not to commence an anti-syphilitic treatment until the pregnancy is somewhat advanced; and finally, the convulsive diseases may also give rise to miscarriages, either by provoking the uterine contractions, or by directly killing the infant.

§ 2. MALADIES OF THE OVUM.

Circumstances, which are often unknown to us, may arrest the development of the foetus; for instance, it may be affected in the mother's body, by those acute diseases which at times beset it after birth; and such affections, though not always fatal to the new-born infant, are the more disastrous to the intra-uterine foetus as they occur the nearer to the period of fecundation. We may add, the presence of several children as a cause dependent on the child; in fact, we have elsewhere seen that the excessive distension produced by a twin pregnancy, frequently brings on premature contractions. However, the uterus is rarely developed enough prior to the sixth month to provoke such an accident, for this seldom happens until a more advanced stage, and then it no longer appertains to abortion properly so called. Some diseases of the parents may affect the child; for example, the vitiated spermatic fluid, such as that from a father debilitated by debauchery or old age, or corrupted by a syphilitic taint, communicates to the new being a principle which does not fail sooner or later to depress it. M. Guillemot attributed the numerous miscarriages of a young lady who consulted him to this cause; for her husband, although of a suitable age, exhibited all the characters of premature decrepitude; but, having become a widow, she remarried, was several times enceinte, and all her subsequent pregnancies terminated happily at full term.

The mother, also, transmits her diseases to the child, since nothing is more common than to see, at the moment of birth, evident traces of the venereal disease on the infant, derived from its mother; and more rarely, though still occasionally, a variolous or scorbutic wo-

man is delivered of offspring that exhibits numerous pustules or other undoubted structural alterations.

Again, the placenta may be atrophied or hypertrophied, or may become the seat of an inflammation; its tissue may degenerate, harden, ossify, and form an hydatid mass or a fatty tumor; and it is not very uncommon to find some purulent collections in its substance, though a number of sanguineous ones are much more frequently met with, the capacity of which varies from the size of a pea to that of a large nut. The elots contained in those cavities exhibit all the degrees of transformation which the blood passes through, whenever it escapes into the substance of our tissues.

This disease, designated by M. Cruveilhier, as *placental apoplexy*, is reproduced at different periods, and the collections, by increasing in number, ultimately overrun the greatest part of the placental mass, thereby interrupting the foeto-placental circulation and speedily causing the foetus' death. Similar effusions of blood may also take place between the divers membranous layers that constitute the envelop of the ovum. For instance, Deneux has found such in the cavity of the caducum itself, between the reflected lamina and the chorion (the cavity recently described by M. Jacquier), as also between the chorion and the amnios.

As regards the insertion of the placenta over the neck, I can scarcely believe that it could produce an abortion, and hence I imagine that the cases cited in support of that view have been misinterpreted; the insertion has been considered as the cause of the accident in those instances, when it certainly was nothing more than a simple coincidence. M. D'Outrepont has advanced the torsion of the umbilical cord as a cause determining the death of the foetus; for the state of compression, says he, resulting therefrom, may impede the circulation. The embryos had been dead for a long time, in all the cases of that kind observed by him.

Again, it may be asked, if the umbilical cord is too short, could it drag off or detach the placenta, or even be ruptured itself? Now, to the facts bearing on this point, reported by Maurieau, Stein, etc., M. Guillemot adds the following: The foetus was about three months old, the umbilical cord was tensely stretched and even half separated near its origin at the navel; two folds of it encircled the neck, and some deep marks were left on this part from their pressure. The circulation, he continues, was therefore interrupted in the cord by the tension and compression it sustained; and the strangling of the child's neck equally contributed to its death. M. Deneux has furnished a case of a rupture of the umbilical vein, and effusion of its blood into the tissue of the cord itself; he found there a clot, equalling a small nut in volume, which had interrupted the circulation in the umbilical vessels by its pressure.

Lastly, the diseases of the membranes, and of the umbilical vesicle, also prove a frequent cause of abortion, especially in the early stages of embryonic life; for in more than two hundred products of conception, that had not passed beyond the third month, M. Velpeau generally found an alteration in some part of the ovum.

§ 3. DISEASES OF THE WOMB AND ITS APPENDAGES.

The causes dependent on the uterus are referable either to a particular state of that organ, or to a peculiar habit of the body, the influence of which is reflected back on the womb; for instance, the following are given as the causes of abortion dependent on this source: An excessive rigidity of the uterine fibres, and their consequent resistance to dilatation; an unusual contractility and sensibility of the organ, and too great a laxity and weakness in the uterine neck. I willingly admit that, in certain females, the excessive sensibility of the uterine fibre will scarcely support, without reaction, the strange modifications it must undergo during gestation. But, I do not equally comprehend that species of opposition, which some authors seem desirous of establishing, between the resistance on the part of the uterine walls and the expansive force of the ovum; for what, indeed, can an ovule, a few lines in diameter, effect against the thick walls of the womb? or, what action can it possibly have on the uterine neck, that will explain the influence which has been accorded to this pretended laxity of the cervix, on the frequency of abortions? The truth is, the ovum and uterus are developed simultaneously, but by forces peculiar to each.

Again, notwithstanding abortions are more frequent in primiparæ, where the females have been married too young or too old; and, although certain women abort in all their pregnancies at nearly the same period, yet we must not on that account attribute these accidents to too great a resistance of the body, or to an extreme laxity of the neck; for these repeated miscarriages, when not owing to the hemorrhagic tendency before alluded to, are far more naturally explained by the excessive irritability of the womb. In fact, the organ has to habituate itself, as it were, to its new functions; a proof of which is, that, in most of those females, the accident is repeated a number of times, but each time at a more advanced period; so that, about the fourth or fifth pregnancy, they go on till full term. Hence, those uterine congestions, which are so often produced in plethoric women by the menstrual periodicity, and that excess of sensibility as well as of irritability observed in nervous females, are the only two predisposing causes that I consider as belonging to the uterus proper, and even they are mere exaggerations, as will be seen, of the physiological condition. Where abortions are often produced by the influence of either of these, they are designated as periodical.

But, independently of these two causes, we must evidently take into account all the diseases of the uterus, whether acute or chronic, whose action is discernible; thus, the various tumors which may grow in the substance of its walls, or may contract adhesions with them and the foreign bodies developed in its cavity, are so many predisposing causes which may both incommod and oppose its free enlargement; and lastly, let us add the various displacements of the uterus, such as prolapsus, lateral obliquities, or anteversion and retroversion, as acting in the same manner.

On the part of the appendages, all the chronic diseases to which they are subject; the adhesions, deformities, displacements, and

their divers degenerations; the organic alterations in the tubes, fibrous, polypous, or other productions seated in the uterine tissue or neighboring parts; unnatural adhesions of the broad or the round ligaments, tubes, or ovaries; in a word, everything that can impede the easy and free development of the womb, must be regarded as occasional causes of abortion. (Madame Boivin, *Recherches sur une cause peu connue d'avortement.*)

Finally, an inflammation of the adjacent organs, particularly the bladder, rectum, etc., may, through the irritation thereby communicated to the uterus, bring on its contractions. Moreover, the existence of any voluminous tumor located in the abdomen must necessarily incommod the development of this organ; as also the compression on the hypogastrium, that some women suffer from the use of corsets, may produce the same effect.

According to Peu, we must add to these various sources of inconvenience, a great contraction of the pelvis which opposes the distension of the womb, and sometimes its elevation above the superior strait; more especially when the narrowness of this latter coincides with the regular, or even the exaggerated dimensions of the excavation.

Besides the causes just enumerated, that have been designated by most writers as the *predisposing* ones, but which, perhaps, would be more appropriately called the *causes of slow action*, there are yet some others that might be termed the *accidental* causes; such as those operating from without, and making their influence more promptly felt. They are very numerous; indeed, by reading the published cases, we find that authors have considered all the moral and physical excitements that women are subject to, as so many causes of abortion. Though in most of the recorded instances we can readily satisfy ourselves that the observers have attached too much importance to those occasional causes of its production; for, generally speaking, it would have occurred without them, only, perhaps, a little later; and even here the expulsion of the foetus is, in truth, owing to the slow and gradual action of the predisposing cause. However, there are some accidental causes whose influence is indisputable. For instance, violent falls, excessive fatigue, too frequent coition, and severe contusions, have in some instances produced immediately a loss of blood, followed by abortion.

Further, such contusions may act in two ways; one, by bruising or violently irritating the mother's organs; the other, by wounding the foetus and determining its death. The latter has been denied by some persons; but to the instances now known in the science, I will add the following from my own observation. A young woman six months pregnant, struck her belly violently against a table while walking in the dark in her chamber; during the night, the infant's movements were for a time quite tumultuous, then they diminished, and on the following morning could not be perceived at all; and two days afterwards she was delivered of a dead child, which presented an ecchymosis on its back as large as the palm of my hand.

I shall not enumerate here the various circumstances that have

been considered as occasional causes; but, by way of showing how their importance has been overrated, I will merely remark that, although certain women, who are constitutionally predisposed to miscarriages, may abort in consequence of a trifling fright, or the odor of a badly snuffed candle, yet there are others, on the contrary, who will suffer the most acute moral impressions, and the most violent physical shocks without any accident whatever resulting therefrom; and nothing would be more easy than to bring forward numbers of cases in support of this proposition; the following, however, may be sufficient: I had an opportunity of observing at the Hôtel Dieu, when acting as "interne" in the obstetrical wards, a young girl in the fifth month of pregnancy, who, being rendered desperate by the desertion of her lover, cast herself into the Seine, from the Pont Neuf, and, notwithstanding such a violent shock, the gestation run on its regular course. Again, M. Gendrin speaks of a young lady who was thrown from a chaise over the horse's head by the animal stopping in his career. This lady was then five months pregnant, but the accident did not prevent her from reaching her full term.

I was consulted in Sept. 1843, by a young lady who was evidently six or seven months advanced. Her physician had suspected an inflammatory engorgement of the womb, and during the third or the fourth month this gentleman had applied fifteen leeches on the neck of the uterus itself; and, strange to say, not only was this application unattended by any accident, but the patient seemed relieved of the distress and pain in the hypogastrium. And, lastly, is it necessary to refer here to all the manipulations, and all the violent remedies, that some distracted women make use of in vain to procure an abortion?

The third order of causes still remaining for our examination, are the abortive measures. These must be distinguished according to the proposed object; that is, whether, in producing an abortion, the indication be to relieve the woman, as well as the infant, if the latter is well developed, from the dangers that threaten them (and we shall treat of the means to be employed in such cases when we speak of the indications presented by the mother's vices of conformation), or whether, contrary to all the laws of morality, the design is to destroy the foetus in the body of its mother, for the sole purpose of concealing the traces of an illegitimate pregnancy. But we have nothing whatever to say concerning the plans made use of by criminal hands in such cases, for, unfortunately, they are too well known.

ARTICLE II.

SYMPTOMS OF ABORTION.

The signs of abortion vary with the period of its occurrence, and also with its determining cause. Thus, when it happens in the early days of gestation, it is attended by but very few remarkable pheno-

mena ; and, in general, the pain is so trifling that the patient scarcely suffers more than from a difficult menstruation ; for the first uterine contractions are sufficient to produce the complete separation of the ovum, the adhesions of which are still very feeble ; and this latter escapes either in mass, or in shreds, usually surrounded by the fluid or half coagulated blood ; and, being mistaken for a clot, it often passes away unnoticed, as most women then suppose that they have only had a slight postponement of their menses, followed by a more difficult and abundant flow than usual.

At a more advanced stage, the symptoms are much better marked, but still varying with the cause of the abortion. For instance, when this accident has been produced under the influences of bad health in the mother, or of chronic diseases, or those causes that operate slowly, by altering the genital organs, or the ovum and its membranes, the following symptoms are ordinarily observed ; namely, shiverings succeeded by heat, anorexia, nausea, thirst, spontaneous lassitude, palpitations, cold extremities, pallor, sadness, depression of spirits, tumefaction and lividity of the eyelids, want of brilliancy in the eyes, a sense of sinking at the epigastrium, of cold about the pubis, of weight near the anus and vulva, pain in the loins, vesical tenesmus, frequent, ineffectual desires to urinate, and a weakness and flaccidity of the breasts, from which a serosity sometimes exudes ; and these phenomena may be considered as the precursors of an abortion ; for, when they have lasted some time, the pains in the loins become more and more acute, extending round to the hypogastrium, and are renewed after short intervals, and finally they assume all the characteristics of the regular uterine contractions. During those pains, if the uterus is sufficiently high up to be easily felt above the pubis, it will be found manifestly harder, whilst at the same time a sanguous discharge takes place from the vagina, which afterwards becomes sanguinolent, and eventually consists of liquid or grumous blood. If the woman be then examined per vaginam, the neck will be found partly dilated (since the dilatation advances progressively with the frequency of the pains) ; the membranes begin to protrude, then engage, and ultimately rupture ; the waters escape, and the foetus and placenta are successively expelled. But, where the pregnancy is not as yet far advanced, the ovum sometimes comes away entire ; although it ordinarily happens, in those cases in which the cause has operated slowly, whether dependent on diseases of the mother or affections of the ovum, that the foetus dies before the labour, or at least during the first pains.

That variety of abortion which is brought on as a consequence of the occasional violent causes, usually has quite another course. Thus, in some instances, the expulsion of the ovum closely follows the accident ; a woman slips in descending a staircase, and falls violently on her seat ; when she rises, her clothes are flooded with blood, for an ovum of six weeks has been driven out, together with a large quantity of fluid blood ; however, this is more apt to occur in the beginning of pregnancy ; for, at a more advanced period, some interval always elapses between the time of the accident, and that

when the abortion takes place. Besides, the phenomena then observed vary, according to whether the cause has affected the mother's organs, or has directly influenced the foetus itself.

In the former case, the mother experiences, at the time of the accident, a sharp pain, either about the loins, or else in some part of the abdomen; and then, after the lapse of a few days, during which the pain has diminished, or even entirely ceased, it is violently renewed, and followed almost immediately by uterine pains and contractions, a slight dilatation of the neck, some discharges of serosity from the vagina, at first reddish, then sanguinolent, and lastly pure blood; and, finally, if the travail continue, the foetus is expelled as usual, and often living.

But when the cause has acted directly on the foetus, matters do not occur in the same way; for the phenomena which announce its death are usually the first observed—that is, the woman feels no pain nor inconvenience; after the few hours necessary to dissipate the agitation and fears caused by the commotion she has experienced, everything is calm, and seems to resume its natural order; but, after the lapse of a few days, sometimes only eight or ten, the movements of the foetus, which had up to this time maintained their force and habitual frequency, become weaker, are separated by longer intervals, and finally become imperceptible. A miscarriage is then inevitable, for the ovum is a foreign body in the uterine cavity, and soon irritates the walls of the organ by its presence; hence, the latter contract, and the abortion generally takes place about eight to nine days after the accident. The process then advances in a more regular manner, because the womb has had time to prepare itself for this act. However, this term is not uniform, as it is not at all uncommon for the dead foetus to remain much longer in the matrix, two or three weeks, or a month, for example. I saw a woman at *la Clinique*, in whom the child's death was clearly ascertained, though she did not abort until six weeks afterwards. In fact, various cases are recorded where the embryo remained in the womb until the ninth month.

The development of the contractions is solicited by the derangement which this condition of death gradually produces in the placental circulation; indeed, the quantity of blood arriving in the placenta often diminishes by degrees, and ultimately becomes almost null; but this is not always the case, since, in some instances, the circulation continues, and the placenta enlarges—attains even to double the volume of that at term, and after its expulsion exhibits the same degree of integrity. Lastly, in others, the placenta still holds together, and becomes developed, says M. Guillemot, but it contracts unusual forms, and exhibits a singular structure, forming a cavity in which the foetal debris are found.

Where a long time thus ensues between the period when the child died and that of its delivery, there is, in general, less fear of a hemorrhage than if the premature labour had taken place immediately. However, in all these accouchements, less blood is usually lost than in those which come on naturally, after the most favorable

gestations; which is probably owing to the fact that the child's death diminishes the activity of the uterine circulation, more especially that of the utero-placental vessels, which must then become obliterated in a great measure, and consequently can furnish but little blood at the time when the placenta is separated.

Further, the general phenomena experienced by the mother after the death of the foetus, are very singular in these cases: thus, if the gestation is somewhat advanced, everything passes off absolutely as if the expulsion of the embryo had occurred, only excepting the discharge of the lochia; that is, in the course of forty-eight to sixty hours after its death, the breasts swell up, the phenomena of milk-fever are manifested, and the lacteal secretion is fully established, after which the breasts again subside and the usual order is resumed. As a general rule, the prolonged retention of a dead infant does not produce any disastrous result to the mother, and I suspect that writers have greatly exaggerated on this point; they say, indeed, that the woman becomes depressed, uneasy, and of a fretful temper; that she experiences lassitude, alternations of heat and cold, oppression at the epigastrium, headache, syncope, palpitations of the heart; her face is pale, the eyes dull and surrounded by a livid circle, the breath fetid, pulse frequent and irregular; in a word, all these general phenomena of a slow fever have been considered by them as so many rational signs of the child's death. But these symptoms are certainly absent in the majority of cases; for most women, after we have succeeded in calming their fears, experience nothing of the kind, and I have known many of them to carry a dead child for several months without even suspecting it; then a new travail comes on, at a variable period, and an abortion takes place.

By examining a dead foetus, we may explain how its prolonged sojourn in the uterine cavity has been wholly inoffensive to the mother's health. In fact, the infant is not putrefied, as is proved by its having no bad odor; the solid parts undergo a peculiar transformation, and the body is somewhat analogous in appearance to one that has been soaked for a long time in water.*

* A child putrefied in the womb presents so different an aspect from one that has undergone the same process in the open air, that it is only necessary to observe this particular condition once or twice, never to mistake it afterwards.

Imagine the little defunct stretched on a table; the flaccidity of its soft parts is then so very striking, that the head becomes flattened under the influence of its own weight, whatever position may be given to it; the soft parts on the thorax fall to the sides; the front of the chest is very much flattened down, the abdomen sunken, and nearly hollow about the navel, and forming two large rounded projections on the flanks; even the extremities exhibit the same sinking in. The discoloration of the skin is particularly remarkable, although often confined to the abdomen, at least when the sojourn of the foetus in the womb has not been very long. The skin of this part has a brownish-red shade, without the least appearance of a greenish hue. This tint is less marked on the chest, neck, head, and limbs; nevertheless, it exists there also. But this is not the brownish hue that often succeeds a green putrefaction; it is a much clearer reddish brown. The cord is no longer twisted, but it forms a true fleshy cylinder, of a reddish color, soft, and saturated with a brown fluid. The epidermis is detached from a considerable part of the surface, and may be easily separated from those places where it is still adherent, thus leaving the

But it happens otherwise when, the foetus being dead, the membranes are ruptured, and the expulsion is delayed; for then, a rapid putrefaction sets in, as a consequence of the child's being accessible to the influences of the external air. A high fever, characterized by the symptoms of a veritable infection, develops itself; a dark fetid liquid oozes from the genital parts, mixed with shreds, in a state of putrefaction; and if the uterine contractions do not speedily relieve the organism from this nest of infection, the patient may rapidly succumb under its deleterious influence. Finally, when the abortion is brought on by the existence of two children, the twins are nearly always expelled simultaneously; although we have occasionally known the woman to abort of one child in a compound pregnancy, whilst the other continued to grow.

ARTICLE III.

DIAGNOSIS.

Judging from the numerous signs just given, the diagnosis of an abortion ought to be very easy; but, unfortunately, these signs are not very clearly marked until the accident is inevitable, and, consequently, when it is a matter of indifference to the patient, whether the physician makes out a clear diagnosis or not.

It is, therefore, in the beginning of such symptoms, especially, that we should endeavor to recognize their true nature, because then only can our art succeed in arresting their progress; but this is exceedingly difficult.

humid dermis exposed, which is as glutinous as if it were lubricated by a mucous fluid; and then the true skin has a bright rose color. The epidermis on the feet and hands is white and thick, and looks as if it had been corrugated by cataplasms. The subcutaneous cellular tissue is infiltrated with a reddish serosity, which is also seen between the muscles and sometimes in the substance of the muscular tissue itself. The bones of the head are feebly held together, their periosteum may be readily detached, and they are movable on each other. The cellular tissue underneath the hairy scalp is infiltrated with a thick serosity, resembling currant jelly in appearance. Finally, whenever we attempt to move or raise the foetus, it slips through the hands just like a fish, that lives for some time out of water, in consequence of the fluid mucus covering its surface. (*Devergie, Méd. Legale.*)

Nevertheless, this description, although perfectly accurate as regards the foetus that dies at an advanced stage, does not equally apply when the death happens in the earlier months. For, according to the judicious remark of M. Martin, of Lyons, the mode of alteration varies with the period of pregnancy at which the child dies. Thus, in the early stage of its formation, when its organization has but little consistence, and approaches the mucilaginous state, it dissolves in the waters of the amnios, which then become thicker and assume the characters of a gummy solution, and no further trace of the embryo is found in the amniotic cavity. But, at a period somewhat later, that is, from the second to the fifth month, it withers away, becomes shriveled and dried up, and looks like a little mummy of a yellow color, or like a foetus preserved for a long time in alcohol. Not unfrequently, the placenta likewise participates in this state of desiccation, the liquor amnii disappearing and being replaced by a thick and apparently an earthy humor, which incrusts the foetus. (*Mémoires de Méd. et de Chir. Prat.*, page 96.)

For instance, how shall we distinguish, in the commencement of gestation, whether the pains felt by the patient, and the blood discharged from her vulva, are owing to a return of the menses, or to an approaching abortion? because the pains attendant on difficult menstruation have the same seat, produce like effects, and are of a similar nature; besides, they are intermittent in character, are developed by degrees, and only cease to be manifested when the substance shut up in the uterine cavity is expelled.

According to Madame Lachapelle, the uterine orifice is open in abortion, and the hemorrhage precedes the pains, but the latter persist, notwithstanding the abundance of the discharge; whilst in difficult menstruation the orifice is closed, and the pains are felt before the escape of the accumulated blood from the uterus, then diminishing or even ceasing entirely when the discharge is well established; still, the contrary happens in very many cases.

It has been stated, also, that the clot driven from the unimpregnated womb exhibits a triangular form, corresponding to that of the cavity where the blood coagulated, which never happens when a product of conception is present; but this may fail, as the clot is mostly changed in its shape by traversing the neck; and, on the other hand, in abortion, the blood may amass and coagulate in the vagina, and the coagulum exhibit the indicated character.

But, if the coagulum be still in the cervix uteri, and supposing the finger is able to reach this point, how can we distinguish whether the foreign body felt there is a clot or an ovum? For this purpose, Holl has laid down the following signs: If the finger introduced into the orifice perceives the mass to become tense during the contraction, to augment in volume and advance towards the vulva, it is an ovum engaged in the os uteri; and if it were a clot, it might be recognized by its fibrous structure; besides, during the pain, its exterior surface would not be more tense, nor more smooth, and it would not appear forced down, but rather compressed; finally, as the ovum resembles a soft bladder, its inferior extremity is rather rounded than pointed, while the coagulated mass is more resistant and solid, is less compressible, and has, in general, the form of a cone, the enlarged extremity of which is above and the apex below.

To conclude, if we should then attempt to move the uterus in its totality by pressing on this mass, it might be easily effected if there were a clot concerned, whilst the parietes of the ovum would yield, and would not transmit the momentum to the surrounding organ with which it is then but feebly adherent. Again, the existence of pregnancy is a sign of the first importance, and every discharge of blood that occurs during its progress is a symptom; for the appearance of the menses during gestation is very rare; but when this state is doubtful, we are reduced to mere conjectures: hence, if it occurs in a woman who has heretofore been habitually regular, but has missed her terms, if the pains continue, notwithstanding the discharge of blood, if they are developed under the influence of any violent cause whatever, or if they exhibit anything unusual either in intensity or duration, there is reason for suspecting an abortion; and the diagnosis

becomes still more certain if the blood escapes more abundantly than it does in ordinary menstruations, if its discharge is accompanied by unusually sharp pains in the lower part of the abdomen, if some clots are expelled, and if the orifice is sufficiently dilated to admit the end of the finger.

At a more advanced stage of gestation, the diagnosis is much more certain : 1. Because we can then generally ascertain the development of the uterus without difficulty ; and 2. The pains are more energetic; the blood flows in greater abundance, and the dilatation of the os uteri is more easily detected ; but it becomes still more certain, when the fœtus' death can be verified in a positive manner. Now, the following are the signs of this occurrence : 1. The abdomen diminishes, instead of increasing, in volume ; 2. The breasts shrink away ; the woman experiences dragging sensations about her loins, and an unusual weight in the hypogastrium, a veritable inert body, which falls towards the side on which she lays from the mere law of gravity ; 3. If the movements of the infant had before been perceptible they now cease to be so ; and lastly, the most valuable evidence is that furnished by auscultation, for an impossibility of hearing the sounds of the foetal heart after the fifth month is a certain sign of the child's death. I will go so far as to say it is the only one, for all the others may be met with, and still the child will live ; though unfortunately the beating of the heart is not perceptible in general before four months and a half of gestation.

" We may regard the abortion as having actually commenced," says Desormeaux, " when the pains succeed each other regularly, and run from the umbilicus towards the coccyx, the intervals diminishing more and more ; when the softening and dilatation of the neck go on constantly increasing ; when the membranes bulge out, and more especially when the waters escape from the vulva." However, all these phenomena, excepting the last, may exist, and yet an abortion does not take place ; confirmatory examples of which are by no means rare, and these should render us very circumspect in our diagnosis whenever the child's death is not ascertained to a certainty.

ARTICLE IV.

PROGNOSIS.

The prognosis of abortion is necessarily variable, according to the time of its occurrence and the cause which has produced it. As regards the fœtus, it is always mortal, since the expulsion takes place before the product of conception is fitted for an extra-uterine life, though I am well aware that cases are reported of children, born prior to the period of viability fixed by law, which have lived ; but these examples, even were they authentic, are too rare to invalidate the general proposition just laid down. As regards the mother, the prognosis is said to be more grave than that of the natural ac-

couchement ; but this proposition, which has been advocated since the days of Hippocrates, requires a little explanation, and should not be received without some restriction ; for the prognosis, considered in relation to immediate consequences, is certainly less serious in a case of abortion than in a natural labour ; but the remote effects are undoubtedly more disastrous in the former case : for instance, the acute diseases which attack lying-in women, are more frequent after labour, whilst the chronic maladies of the genital organs which appear in advanced age, are more common in females who have often aborted than in those whose accouchements were at term. Again, it is highly important to notice the unfavorable influence that one abortion seems to have over subsequent pregnancies, for whenever a woman has had a miscarriage, she is more predisposed than others to a similar accident, and hence great precautions should always be taken to prevent it.

The period when an abortion occurs also influences the prognosis, although we cannot exactly say, with Desormeaux, that it is more serious for the patient in the advanced stages of gestation ; no doubt, as before stated, it scarcely constitutes an indisposition in the first or even the second month ; but in the third or fourth, the expulsion of the foetus demands a certain dilatation of the os uteri, and some tolerably energetic contractions ; for the neck and body of the uterus have not as yet undergone the modifications necessary to such an effort, and the delivery of the after-birth often presents difficulties that are rarely met with at a more advanced stage of gestation ; whence I conclude that an abortion is then more grave and painful to the patient, as also more dangerous, than in the fifth or the sixth month.

Lastly, the prognosis varies with the cause of the accident. Thus, the most serious of all is an abortion brought on either by internal medicines or by manipulations ; while a miscarriage determined by slow and gradual influences, is usually attended with less danger than one caused by external violence or some powerful moral commotion. In this latter case, in fact, the hemorrhage which precedes, accompanies, or follows the abortion, is nearly always much more disastrous. Lastly, when it occurs in the course of an acute inflammation of an important organ, or during the existence of an acute disease of the skin, it becomes of very grave consequence.

ARTICLE V.

DELIVERY OF THE AFTER-BIRTH.

This exhibits very different phenomena according to the period when the abortion takes place ; and, in this respect, it is highly important to distinguish the accident in the first two months from that of the third and fourth, as also from that of the fifth and sixth ; for the ovum is usually expelled entire in the first and second months, but in the two latter the expulsion of the placenta is accomplished

nearly in the same way as at term ; and we shall consider it more particularly hereafter. But in the third and fourth months it is altogether different, because the placenta, which is already voluminous, has contracted at this period numerous and very intimate adhesions with the womb ; and the latter has not, as yet, acquired all the contractility of tissue that is so evident at term, and consequently the premature contractions manifested, although sufficiently energetic to rupture the ovum, are not adequate to the destruction of the utero-placental adhesions. Hence, under the influence of such contractions, the amniotic sac, being pressed on all sides, yields near the neck, the waters escape, the little foetus follows after, and the very delicate umbilical cord breaks spontaneously ; at the same time a certain quantity of liquid or coagulated blood, is poured out, and very often the minute infant is lost in the midst of the coagula that accompany its discharge. Then the uterus, from being partially evacuated, retracts, the neck closes up, and the symptoms disappear ; nevertheless, the placenta and the membranes are still undelivered, and they may remain in the womb for eight, ten, or twelve days, or even longer. Dr. Advena, of Labischin, reports an instance where the after-birth was not expelled till three months subsequent to the abortion, this latter having occurred at the fifth month of pregnancy. (*Journal de Chirurgie*, Aug. 1843.)

The symptoms which may then result from a retention of the placenta are very variable, and they should be carefully studied.

1. Very frequently, nothing at all unusual is observed for a few days following the miscarriage. The general health is good ; the patient, believing herself entirely cured, gradually resumes her ordinary occupations ; when all at once, and without any known cause, some intermittent pains are felt in the hypogastrium, and a little blood escapes from the vulva. The woman often neglects these primary symptoms, but they persist and augment in intensity, thereby constraining her attention to them ; for the placenta has become a foreign body in the womb, and, irritating the uterine walls by its presence, determines their contractions ; which latter break up the utero-placental adhesions, and the after-birth is free in the uterine cavity. This separation is always accompanied by hemorrhage, which is at times very abundant, because the os uteri dilates with so much difficulty, to permit the foreign body to escape, that the latter, by remaining in the womb, encourages a hemorrhage by irritating the organ and preventing the complete contraction of its walls ; insomuch that, if art does not seasonably interpose, even life itself may be endangered from the great amount of the discharge. And, what is still worse, if the physician did not happen to be present at the time of the miscarriage, if he had not carefully examined all the clots himself, the attendants will not fail to tell him that the after-birth and the child were both expelled together, and, should he pay any regard to their statements, he may possibly overlook the cause of the accident altogether. I have been summoned several times to such instances, and have invariably been told by the persons questioned that the placenta was delivered. Consequently, the

accoucheur should only rely on his own personal examination in such cases. He must absolutely touch the female, and then he will usually find the os uteri to be partially dilated, and a portion of the placenta hanging in its orifice; when it is only necessary to seize this portion with the two fingers, for its extraction is, in general, quite easy. In case of necessity, Levret's abortion-forceps, or Duges' placenta-crotchet, might be used for this purpose.

Where the placenta is not entirely separated, and the simple tractions do not effect this object, a finger should be introduced into the uterine cavity (if the dilatation of the neck will permit), and an attempt be made to slip it between this mass and the uterus; but if this does not succeed the tampon must be resorted to, and the ergot be administered at once, for the conjoint use of these measures rarely fails in arresting the hemorrhage, and in bringing on a sufficient degree of contraction to expel the secundines.

2. But matters do not always pass off so happily, and a retention of the placenta may give rise to the most serious accidents. In fact, it sometimes remains in the uterine cavity after having been separated wholly, or in part, and soon undergoes decomposition just the same as if it were exposed to the air; the lochia become fetid; the uterine walls, being in contact with the substances in course of putrefaction, absorb a portion thereof, and, as a consequence, fever is developed, together with all the symptoms of a putrid infection. In these distressing cases, we should evidently relieve the womb from those foul materials that infect the whole economy; but unfortunately the neck of the uterus is completely closed up, and an introduction of the finger is thereby rendered impossible. Often, indeed, it is exceedingly difficult to make the extremity of a cannula enter for the purpose of throwing up detergent injections into the uterine cavity, and we are then compelled to await the complete expulsion of the excessively fetid sanguous matters resulting from the placenta's decomposition. In such cases, M. Velpeau speaks favorably of the use of ergot. This, indeed, is a remedy that might be used, but from which, nevertheless, we should not expect too much.

A lady, thirty-five years of age, whom I suspected to be pregnant, although she would not believe it, felt a discharge from the parts after a suspension of the menses for two months and a-half, which she at first mistook for a return of her courses, but which, after riding out in a carriage, was suddenly converted into a profuse flooding. Having been summoned immediately, I found the os uteri slightly dilated, and I forthwith employed various measures adapted to the arrest of the discharge, and among others the ergot. The hemorrhage gradually diminished, and at ten o'clock P. M. (six hours subsequent to the invasion of the symptoms) it had entirely ceased. During the first five days the patient did very well, but on the sixth I thought I detected a slight odor in the lochia, and at three o'clock in the afternoon a violent chill came on, which lasted an hour. From this moment all the phenomena of absorption were manifested; I immediately administered forty grains of the ergot,

but without effect, for nothing came away ; and, notwithstanding the enlightened efforts of Messrs. Chomel and Moreau, who were several times called in consultation, this unfortunate lady died on the tenth day following the appearance of the first symptoms. At the *post-mortem* examination, we found the uterine tissue softened, and its cavity filled by the putrefied and still adherent placenta, which we could not separate without tearing the proper substance of the womb.

3. It may further happen that the placenta, maintaining its vascular adhesion with the internal surface of the organ, continues to be developed after the child's death, the cord and foetus become atrophied and then completely destroyed ; or, indeed, the ovum may rupture, and the little product escape, leaving the membranes behind.

Again, these envelops may undergo various modifications, but the most common is the morbid product known under the name of the *mole*. In fact, it has been generally conceded, since the researches of M. Velpeau on the subject, that the hydatiform, or other moles which are expelled from the uterine cavity, are merely the result of an altered product of conception.

4. Lastly, there is yet another mode of termination, admitted by Nægèle, Osiander, etc. I allude to the absorption of the placenta, retained in the cavity of the womb ; for although such an absorption has been observed, even after the accouchement at term, yet most of the reported cases refer especially to miscarriages. (*Vidē Delivery of the After-birth.*)

ARTICLE VI.

TREATMENT OF ABORTION.

The treatment of abortion consists, both in preventing it, in favoring the expulsion of the ovum when it is inevitable, and in remedying the various accidents that may complicate it.

1. *Preventive Measures.*—When the miscarriage is dependent on the woman's bad constitution, or on a lesion of the genital organs, we must endeavor to combat and destroy this pernicious predisposition, more especially in the intervals between the gestations. But I shall say nothing at this time of the means of modifying the general vices of the constitution, since they necessarily vary with the nature of the affection. It is particularly important, however, to bear in mind the disastrous influence of syphilis (whether the father or the mother be infected with it) over the life of the foetus ; and we should persuade them to submit to a mercurial course.

When it happens that several abortions have resulted in consequence of some displacement of the uterus, the latter should be remedied by the appropriate measures ; for instance, in the commencement of pregnancy, the woman should avoid all fatigue and every violent effort, and it is even advisable for her to remain in the recumbent position until the uterus rises above the superior strait.

We award the proper value to the influence attributed by Desormeaux to the putative rigidity and excess of sensibility or contractility in the uterine fibre, as well as to the excessive weakness or relaxation in the fibres of the neck. But whilst interpreting the action of those causes in a different manner, we believe, with him, that bathing, general bleeding, and a regulated course of living, are the means best suited to moderate this great irritability of the organ ; and that a tonic and strengthening regimen, aided by the ferruginous preparations, cold baths, and the chalybeate mineral waters, will be the most usefully employed in those cases where the general debility of the patient may have seemed to exercise some influence over her former abortions.

Plethoric women, who usually have profuse menstrual discharges, and who may have previously suffered from abortion at the periods of menstruation, all of which had been preceded by the symptoms of general or local plethora, and all followed by more or less copious discharges, should be subjected before fecundation to a restricted regimen ; and during gestation they should avoid all moral and physical excitements, and should remain in bed eight, ten, or even twelve days at every monthly term ; besides, they ought to be bled several times during the earlier periods of pregnancy, more especially just before the time for the menses to appear.*

These, more than other pregnant women, should renounce the use of corsets, which, independently of the restraint they make on the development of the breasts, oppose the free return of blood, by interfering more or less with the abdominal and thoracic circulation, and thereby favor a congestion in the inferior organs.

Feeble, cachectic females, who are impaired by former diseases, and those whose tissues are soft, and their circulation languid, or who, from being habitually irregular, are affected with chronic leucorrhœa, are often attacked by hemorrhages during pregnancy which ultimately lead to an abortion.

In such patients the face is pale, the pulse soft, small, and irritable, the tongue white, digestion painful, the intestines torpid, and the extremities cold. The least exercise fatigues them, sometimes even exhausts their strength. The fatigue is often accompanied by a sensation of weight, of painful draggings in the groins and lumbar regions, and, should they remain standing for any length of time, the uterus seems to require some support, as it appears just on the point of escaping by the vagina or rectum. Even in the earliest stages they feel something like a weight in the lesser pelvis, always pressing on the most dependent part.

Now the best mode of preventing such a condition, is to prescribe

* The physician often meets with much opposition from persons out of the profession, when he proposes a preventive bleeding in the early stages of gestation. Particularly, should any accident happen shortly afterwards, they would not fail to reproach him with it. This, however, is no just reason for not acting according to his convictions, or for yielding in cases where he believes it really useful ; and experience has fully proved that, in such instances as those we have described, it is one of the best preventive measures.

a tonic regimen, together with the ferruginous and bitter preparations. Canella, in powder, has been recommended; and Sauter highly extols the use of powdered savine; he asserts, that he has succeeded in correcting this pernicious predisposition in pregnant women, who had previously had several miscarriages, by administering fifteen grains of the powder three times a day, and he continued it for three or four months; by this remedy he has arrested flooding and prevented abortion, and many patients can attribute the fact of having children born at full term to the employment of this precious drug.

White, of Manchester, has particularly recommended cold bathing, especially sea-bathing, to be often repeated, both before and during pregnancy.

The accoucheur must therefore search in the history of former miscarriages for the indications to guide him in the use of preventive measures; and it is likewise very important that he should make himself acquainted with all the accompanying circumstances.

Pregnant women are very often constipated, and this constipation frequently becomes the cause of periodic abortions, by the irritation it produces; hence, it should be prevented by the use of some simple injections, with the addition of one or two tablespoonfuls of linseed oil, regularly, every other day, for two weeks before the period when the abortion occurred last time, and these ought to be continued for two weeks after it.

When this accident has already occurred a number of times in former pregnancies, it is always indispensable for the woman to abstain altogether from intercourse with her husband, for all sources of irritation must evidently be withdrawn from the womb. Again, if the foetus was expelled dead in the preceding gestations, and this death had been caused by some lesion of the ovum, it is almost impossible to recognize, and consequently to prevent, a similar alteration; for, in some unfortunate circumstances, nature seems to laugh at all attempts of art, and an abortion reappears. Still, we must not despair when the woman becomes again pregnant, for experience fully proves that, notwithstanding numerous former abortions, a fresh pregnancy has sometimes succeeded in reaching full term. Doctor Young (*Rigby*, 91) relates, in his lectures, the history of an unfortunate lady, who, after having had thirteen successive abortions, became *enceinte* for the fourteenth time, and was happily delivered of a living infant at term.

But, notwithstanding all these precautions, it sometimes happens that an abortion is threatened. The patients are affected with shiverings from the most trifling causes, pains in the hypogastrium, loins, etc.; some uterine contractions manifest themselves, the sexual parts become moist, and occasionally even the os uteri dilates; but, even here, we must not lose all hopes of arresting the accident, in spite of those symptoms.

If the patient is robust, the pulse full and frequent, more especially if the development of such signs had been preceded by the phenomena of plethora, bleeding in the arm should be at once re-

sorted to, and the woman be laid as horizontally as possible, and opiates immediately administered. The laudanum of Sydenham may be given in the dose of twenty, forty, or even sixty drops, diffused in a small quantity of some mucilaginous liquid as an injection, and repeated at intervals of an hour, until the contractions disappear. This remedy (of which we have before spoken) is one of the most efficacious in cases of that kind, and sometimes it alone has enabled us to arrest a labour, whose premature termination seemed to be inevitable, and thus has permitted the gestation to pursue its regular course.

I cannot refrain from citing the following instance in illustration. A woman advanced to three months and a half, was taken with pains in the abdomen and loins, after a violent altercation with her husband; on the following day the pains augmented, and a little sanguinolent serosity escaped from the genital organs; the pains still continuing, and the discharge having somewhat increased, on the third day the patient came on foot to *la Clinique*, and I found, on her arrival, that the uterine contraction was very distinct, the pains sharp, and renewed every eight or ten minutes; some pure blood was oozing from the vulva; and the orifice was sufficiently dilated *to permit the finger to pass readily as far up as the naked membranes*. I administered sixty drops of laudanum, divided into three doses, which were given at intervals of three-quarters of an hour, and, by the end of this time, the pains disappeared, everything resumed its natural order, and the gestation went on till full term.

I might multiply such citations almost *ad infinitum*, but the above is sufficient to show that, however inevitable the abortion may at first appear, we should never abandon all hopes of preventing it. I may add, that the administration of opium in the doses just indicated, or even carried to a hundred, or a hundred and fifty drops in the twenty-four hours, has never been followed by serious consequences. Sometimes, perhaps, a little somnolency or heaviness about the head, or a general torpor may result in consequence; but a few glasses of lemonade will soon dissipate all that. For after all, when even the foetus' death must have been either the cause or the effect of the primary symptoms, what do we risk in calming or arresting the uterine contractions? because, as we have already seen, the dead child may prolong its residence within the intact membranes without any unfavorable consequences resulting to the mother. And besides, as it is almost impossible to ascertain its death with any degree of certainty prior to the fifth month of gestation, we must act in such doubtful cases just as if it were living; although there can be no question that, if the foetus were really dead, it would be better to permit the contractions to go on, and its expulsion to be effected. But, even supposing these are wholly suspended, the expulsion is somewhat retarded, and that is all; for after the lapse of a certain time the foetus, acting like a foreign body in the uterine cavity, will irritate its walls, and a new labour will sooner or later take place in consequence.

To these remedies (the venesection and opiate treatment) we must conjoin strict confinement to bed, absolute rest of mind and body, the use of demulcent beverages, cold lemonade, veal broth, chicken water, and the application of cold compresses, frequently renewed, over the abdomen; which compresses are to be saturated with some fluid whose temperature is progressively lowered. "Local bleedings," says M. Gendrin, "are too much neglected, especially in the treatment of the utero-placental hemorrhages; indeed, we have so often had occasion to congratulate ourselves for having advised them in those cases, that we now prescribe them with great confidence whenever the general condition does not directly indicate a depletory venesection. We direct them: 1. When there are any sharp pains in the neighborhood of the uterus or groins, and we apply them to the latter, the anus, or even the vulva; 2. In cases of a considerable turgescence of the hemorrhoidal tumors (if any such exist); and 3. In the phlegmasia of the adjacent organs, such as the large intestine, bladder, etc."

In these two latter cases we fully coincide in the opinion of M. Gendrin; but, in the first, we should much prefer having recourse to a general bleeding in the arm, or, as he himself advises, further on, to the application of leeches at a distance from the uterus; for instance, near the breasts, arm-pits, etc. etc. Finally, to the means already enumerated, we must further add the use of irritant revulsives, placed upon the upper part of the trunk and the thoracic extremities, and must also recommend in a more special manner the application of dry cups, the decidedly beneficial effects of which we have often witnessed in cases where an uterine plethora seemed to be the cause of the symptoms; but where, however, the general condition required some precaution in the use of blood-letting.

2. It has been already stated that a copious hemorrhage, an intensity of the pain and of all the other phenomena, and more particularly a rupture of the membranes, render an abortion from that time inevitable; and hence, the only course in such cases is to facilitate the expulsion of the product of conception. But still, if the hemorrhage is not of such a character during the first three months of gestation as to compromise the woman's life, the physician should remain a simple spectator of the efforts of nature, and confine himself to superintending the progress, for the expulsion of the ovum ought to be left entirely to the uterine forces; and then it sometimes comes away whole, which is considered a very favorable circumstance. Moreover, according to the recommendation of Baudelocque, he should be very careful not to rupture the membranes, for that would only retard the delivery, and render it still more dangerous. In fact, when the foetus escapes alone, this latter might be attended with the difficulties just pointed out in the preceding article. At a more advanced period, that is, towards the fifth or the sixth month, the course of the physician is very nearly the same as it would be at term. Since the size of the foetus, which has now become quite large, requires a greater dilatation of the os uteri; but this is longer in being accomplished, and therefore it is usually necessary

for the child to present by one or the other extremity of its long diameter to the os uteri; however, it sometimes happens that some portion of its trunk presents there, and its delivery is neither much more difficult nor much slower than usual. In such cases, moreover, the mechanism of a spontaneous evolution may be frequently observed. The delivery of the after-birth does not, as a general rule, exhibit those difficulties which it presented in the earlier months; in truth, it closely resembles the same process in the accouchement at term.

3. A hemorrhage is one of the most common symptoms of this accident, and it may either precede, accompany, or follow the expulsion of the foetus; indeed, this phenomenon is so frequent an occurrence that most authors make it the principal disease. It is very true that, in certain cases, this discharge becomes a cause of abortion, but more often it is merely a consequence of the latter; while at other times the accident even occurs without much or any bleeding; although this last fact is very unusual, more especially in the false labours that take place before the end of the fourth month; because a more or less abundant discharge of blood nearly always shows itself during the first expulsive pains, and it persists until the uterus is completely emptied; but, as we all know, nothing of this kind is observed in the accouchement at term. M. Jacquemier has happily explained the difference between the two in the following manner: He states that, towards the end of gestation, the placenta spreads out in a measure from the centre towards its circumference, in order to conform itself to the uterine enlargement at its greatest extent; and this is accomplished in such a way that its different lobes, by separating from one another, leave a considerable space between each two.*

Whence it happens that the uterine contractions (within certain limits) do not separate it from the walls, for the placenta marvellously accommodates itself to the retraction of the organ until it reaches its own proper limits; and even then its great flexibility permits a further reduction, so as to follow the uterus as it becomes less, before the detachment commences, and this latter phenomenon only takes place when the whole foetal mass is nearly expelled. But, prior to the fourth month, the after-birth is far from offering the same conditions, since the thickness of the utero-placental caducous membrane, and the large quantity of plastic matter interposed between the lobes at that time, confer upon it a much greater density; and therefore it can only yield within very narrow limits, either in the way of extension or retraction towards its centre. Hence, the facility of its separation during the early contractions, the rupture of a certain number of vessels, and the incessant hemorrhage throughout the whole duration of the labour.

But whenever, notwithstanding the use of general measures, such

* To convince one's self of the truth of this fact, it is only necessary to see the placenta still adherent to a uterus which has been developed but is not yet retracted, or even the uterine surface this mass occupied; for the latter is nearly one-third larger than the surface of the placenta which covered it. (Jacquemier.)

as the horizontal position, cold drinks, the application of refrigerants to the hypogastrium or thighs, and the administration of opiates, the discharge of blood continues in sufficient abundance to endanger the mother's life, an abortion thenceforth becomes inevitable, and the primary object of the accoucheur should be to bring on the contractions and the evacuation of the organ.

He should also employ some general stimulants to sustain the woman's strength, and, at the same time, those medicines having an immediate action on the womb itself, such as the tincture of cinnamon, &c., but above all the ergot, or *secale cornutum*. However, when the miscarriage comes on at an early stage of the gestation, these measures are often without any efficacy, for it is then exceedingly difficult to excite the contractions of a viscus whose muscular organization is still so imperfect; or at least, if they are aroused, they are frequently inadequate to give the neck a sufficient degree of dilatation. The tampon then alone remains: this, when well applied, acts in two ways: 1st, by opposing the escape of the blood externally, thus forcing it to coagulate, and consequently to obliterate the bleeding vessels; and 2d, by irritating the womb by mere contact, thereby determining its retraction, and the expulsion of the product of conception. This circumstance, indeed, is one of the best-founded objections to the use of the tampon in the early months of gestation. But, in truth, is it not rather an advantage than otherwise? because the cessation of the flooding is always a necessary consequence of those uterine contractions; and is the mother's life bought too dear, when it is saved by the expulsion of a fetus, which, in most cases, is dead even before the application of the tampon? Besides, this measure is not always necessarily followed by an abortion. Again, there is no reason to fear the conversion of an open into a concealed hemorrhage by the employment of the tampon, before the sixth month; for, notwithstanding the observation of Chevallier, the accumulation of a large quantity of blood in the womb would seem to be impossible at this early period, without supposing an abnormal relaxation of its walls; though, where the pregnancy is advanced to the fifth month, the accoucheur should carefully watch the body of the uterus after the tampon is applied, and assure himself, every moment, that its volume is not increasing.

The following is the manner in which this operation is generally performed, namely; some dossils or pellets of charpie are prepared, sometimes dry, at others smeared with cerate, and the vagina is then stuffed with these piecemeal, care being taken to have the first portions applied directly on the uterine neck; it would be better, perhaps, to connect these by means of a thread, so that they can afterwards be withdrawn the more easily. When the vagina is filled, some thick masses of charpie are applied directly over the vulva to sustain the pellets, and the whole is held in position by a T bandage.

This operation is sometimes tedious, on account of not having the necessary materials at hand, and then we might resort to the plan often advantageously employed by Dewees; namely, to use a soft

sponge which is large enough to fill the whole vaginal cavity, and which is to be pushed up as far as the os uteri, after having been previously soaked in vinegar. The blood infiltrating into the pores of the sponge soon coagulates and forms a voluminous clot which seals up the vagina hermetically, without giving rise, says Dewees, to any of those accidents produced by the ordinary tampon; besides, it is borne without inconvenience, and may be left there until the expulsion of the ovum, although it would be better to withdraw it after the lapse of some hours, to observe the progress of the dilatation, and then replace it again if the neck is still closed. Nevertheless, the accoucheur ought constantly to bear in mind that, whatever plan be adopted, the application of the tampon is nearly always followed by an abortion, and therefore it must never be resorted to, until the latter seems to be inevitable.

Some practitioners apparently prefer the plan of rupturing the membranes artificially, in some particular cases; but this measure, to which I shall again allude, in speaking of hemorrhage during the last three months, does not seem to me applicable before the sixth month, except in a few occasional instances, and I should in general decidedly prefer the tampon to it.

In fact, a rupture of the membranes is necessarily followed by a miscarriage; but the tampon, when early applied, leaves some hope of the gestation's continuing on till term: again, the tampon always arrests the bleeding; whereas, after rupturing the membranes, the uterus may not retract at all, the hemorrhage does not cease, and the tampon may still be necessary.

Finally, let us add that, in the first three months, the rupture is followed almost immediately by a discharge of the waters and the foetus' escape; but the expulsion of the placenta and membranes is thereby rendered still more difficult. .

PART III.

OF LABOUR IN GENERAL.

LABOUR is that function which consists either of the spontaneous or the artificial expulsion of a viable foetus through the natural parts of generation.

This definition of the accouchement, differing somewhat from those given by most modern writers, has the advantage of furnishing me a basis whereon to found a practical division of labour; for when, in fact, the expulsion of the foetus takes place from the efforts of nature alone, it is called a *spontaneous*, or a *natural*, labour; but when nature is inadequate to the accomplishment of this effect, without the intervention of art, the accouchement is said to be *artificial*, *laborious*, and also (though improperly) *against nature*.

This function has also received different denominations, according to the period of pregnancy at which it is manifested; thus, it has been named *legitimate*, *tempestive*, or *at term*, when occurring within a week before or after the expiration of the ninth month. And *premature*, or *precocious*, if it takes place during the seventh, the eighth, or the beginning of the ninth month. Again, the latter may be spontaneous or artificial, according to whether it is simply the work of nature or has been brought on by the intervention of art. Moreover, this last case should be carefully distinguished from what the ancients called the *forced labour*, in which they not only provoked the manifestation of the uterine contractions, by a more or less direct irritation, but, as a consequence, terminated the labour.

Lastly, it is called *tardy*, or *retarded*, when the delivery is not accomplished before nine months and a half or ten months.

BOOK I.
OF PREMATURE AND RETARDED LABOURS.

ARTICLE I.

OF PREMATURE LABOUR.

When a woman is delivered in the seventh or eighth month of her gestation, the labour is said to be premature. Now a great number of causes may determine the child's expulsion before the ordinary term of its intra-uterine life; such, for instance, as an excessive distension of the womb, whether this be occasioned by too great a quantity of the amniotic liquid, by hydrorrhœa, or by the presence of two or more infants in the uterine cavity; the accidental death of the foetus; the artificial evacuation of the liquor amnii; any violent muscular effort; the abuse of strong purgatives; various acute diseases, more especially those of the skin; and certain conditions of the animal economy, as plethora, great debility, or an excessive irritability and sensibility.

The delivery before term is often preceded by an intense chill, during or immediately before which, according to Burns, the child dies. In some cases the uterus is fully developed, prior to the ordinary term of gestation, and then the contraction commences and goes on as regular as usual; but, in most instances, the organ has not as yet undergone all the necessary modifications for the proper accomplishment of labour, and the latter, consequently, exhibits numerous irregularities in its course; and, besides, the uterine neck and orifice are not yet properly effaced and softened. For example, it is not at all uncommon to find the neck sufficiently dilated, during the primary pains, to permit the introduction of the finger, and this notwithstanding the lips are still thick and of a considerable length. Of course, this extent of the neck must greatly retard its dilatation, for it cannot really commence enlarging until after the effacement is completed; and this last process is oftentimes tedious.

The first, or preparatory stage, is marked by the presence of pains that are very irregular both in their duration and intensity, accompanied by a feverish state; the patient experiences a very distressing sensation of weight about the belly, and she is usually restless and agitated. When the cervix is once effaced, the os uteri begins to dilate; but this dilatation is much slower than at term, because the neck has not yet attained the same degree of ramollissement, and therefore offers more resistance to the contractions of the body.

But, although the first stage is somewhat longer, the second, or that wherein the expulsion occurs, is most generally shorter than in a natural labour at term, owing to the small size of the child; nevertheless, this advantage is often counterbalanced by the irregularity and the spasmodic nature of the contractions, which are then more apt to take place than under ordinary conditions. In fact, as the muscular organization of the uterus is not yet complete, we can understand how its properties of contraction are less perfect; and, also, on the other hand, how the morbid cause which has developed a premature action in it must necessarily have an influence over the more or less regular course of these contractions.

The vertex presentations are far from being so frequent here as in the natural labour at term, and those of the breech, according to M. P. Dubois, are proportionably more common as the labour is the more premature. For instance, in ninety-six stillborn children, delivered during the last two months of gestation at the hospital of *la Maternité*, seventy-two presented by the head, twenty-two by the pelvic extremity, and two by the shoulder; whilst in seventy-three living children, who had only reached the seventh month of the intra-uterine life, sixty-one presented the head, ten only the breech, and two the shoulder. Hence, it is evident that the number of pelvic presentations in premature parturitions is comparatively greater where the children are born dead, and also that, when the foetuses are living, the podalic extremity presents first much oftener than in the ordinary accouchement.

Finally, according to Burns, those women who are taken in labour before term are more exposed than others to hemorrhages during its progress, and their delivery is both more difficult and more complicated than usual.

"When a woman is threatened with premature labour," continues the author just named, "we ought, unless there be some very decided marks of the death of the child, to endeavor to check the process, which is done by keeping the patient cool and tranquil in the horizontal position, bleeding her in the arm if she be plethoric, or the pulse be throbbing; but above all, by administering opiate injections immediately, (forty to sixty drops of Sydenham's laudanum, in two or three doses, in the course of a couple of hours.)"

When the labour is once established, it is to be conducted much in the same way with parturition at the full time; nevertheless, says Burns, the following observations should be carefully attended to: 1. The patient must avoid much motion, lest a hemorrhage be excited; 2. Frequent examinations, and every other kind of irritation, are hurtful by retarding the process, and tending to produce spasmodic contraction; and, if this takes place, a full dose of the tincture of opium should be given at once; 3. A rigid state of the os uteri requires venesection to a moderate extent; 4. But the delivery of the child is to be retarded rather than accelerated in the last stage, in order that the uterus may have time to contract on the placenta; 5. This is to be further assisted by rubbing and gently pressing on the uterine region after the child is born; 6. Even the delivery of

the after-birth requires more than ordinary care: thus, we are not to pull on the cord, for it is easily broken; besides, it is often necessary to introduce the hand in the uterus to aid the detachment of the placenta artificially, and to prevent its being retained by the irregular contractions; and lastly, great attention is to be paid to the patient herself for some days after the delivery, for it has justly been observed that she is, from the mere fact of having had a premature labour, more exposed than others to those inflammatory affections which so often complicate the parturient state. With regard to the premature labours brought on by the accoucheur we shall say nothing at present, as we shall have to treat of them more particularly in the fourth part of this work.

ARTICLE II.

OF RETARDED LABOUR.

As an ordinary rule, the pregnancy terminates about the two hundred and seventieth day after the conception has taken place. However, the accouchement often occurs at an earlier period than this, and, on the other hand, it may not appear until some time in the course of the tenth month, or even until after this period has passed, although this latter variety is much more unusual. In making this statement, we decide a question in advance that gave rise to some very sharp and animated discussions during the last century; and, still more recently, the tribunals of England have summoned to their bar the most celebrated physicians of Great Britain, and have listened to numerous and protracted pleadings for and against the legitimacy of retarded labours.

But this question no longer presents to the medical jurist the same difficulty that it did in the past century, for the French law has now declared every child to be legitimate that is born after the one hundred and eightieth or before the three hundredth day of marriage; and, as if it were possible, in the eye of the law, for a pregnancy to continue more than ten months, it further adds that the legitimacy of a child born three hundred days after the dissolution of the marriage contract *may be contested*.

Although a legal decision has thus deprived the question of retarded labours of its greatest interest, yet we, as practitioners, may be permitted to recall briefly the principal reasons that militate in their favor.

At first, it was very natural to study the process in those animals which approach the nearest to man, in order to judge of the possibility of a retarded birth in the human species.

Among the numerous observations made on this subject, those submitted by M. Tessier, in 1819, to the Academy of Sciences at Paris, of which the following is a summary, are probably the most exact, namely: out of one hundred and sixty cows, fourteen calved from the two hundred and forty-first to the two hundred and sixty-sixth

day; three, on the two hundred and seventieth; fifty, from the two hundred and seventieth to the two hundred and eightieth; sixty-eight, from the two hundred and eightieth to the two hundred and ninetieth; twenty, to the three hundredth; and five, on the three hundred and eighth day, which gives a difference of sixty-seven days between the births, if we compare the shortest with the longest period. And, of one hundred and two mares:—

3 foaled	on the	311th day.
1 "	"	314th "
1 "	"	325th "
1 "	"	326th "
2 "	"	330th "
47 "	from the	340th to the 350th day.
25 "	"	350th " 360th "
21 "	"	360th " 377th "
1 "	on the	394th day.
<hr/>		<hr/>
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Making a difference of eighty-three days between the two extremes. Nine months and ten days being the average term for cows, and eleven months and ten days for mares.

These well-ascertained variations in the terms of gestation in animals, certainly afforded a strong presumption of their existence in the human species also; for if cows and mares, whose gestations are not troubled with those various causes that may lead to changes in a woman, may thus defer for some time the ordinary period, how much more would human females, who are subject to so many diseases, and upon whom the moral and social relations exert so powerful an influence—how much more likely would they be to offer numerous varieties in the duration of their pregnancies?

But all this was a mere probability; and the question would still remain undetermined, if careful observations directly made, and well made on the human species, had not removed all doubts on that point; for several cases bearing on this subject now enrich our science, where a single well-established instance would suffice to produce conviction. Take, for example, the following case, reported by Desormeaux: A lady, the mother of three children, became affected in her mind; for which all the resources of therapeutics were tried in vain. As her physician thought that another pregnancy might possibly re-establish her intellectual faculties, the husband consented to note on a register the time of each sexual union, which only took place every three months, lest a previous conception (then uncertain) should be disturbed; and this lady, who was closely watched by her domestics, and was besides endowed with the most rigid principles of religion and morality, was not delivered before the expiration of nine months and a half.

Merriman furnishes a summary of one hundred and fifty gestations, in each of which he has noted the precise day of the menses' last appearance. From this table it appears that—

5 women were delivered in the 37th week— <i>i. e.</i> , from 252 to 259 days.
16 " " " 38th " " 262 to 266 "
21 " " " 39th " " 267 to 273 "
46 " " " 40th " " 274 to 280 "
28 " " " 41st " " 281 to 287 "
18 " " " 42d " " 288 to 294 "
11 " " " 43d " " 295 to 301 "
5 " " " 44th " " 303 to 306 "

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From the foregoing statement, we learn the great variety in the length of gestation. There is, in fact, a difference of fifty-six days between the two extremes; and, supposing that each woman became *enceinte* five days after the cessation of her courses, five of them, at least, would overrun the average term of nine months by ten or twelve days.

BOOK II.

OF NATURAL LABOUR, AT TERM.

BUT, whatever be the period of the accouchement, it is always accomplished under the influence of the same forces; though there is an important distinction to be established in the phenomena, constituting what practitioners are agreed to call the *labour*. In truth, whenever we examine carefully the whole of those phenomena, we can readily make out two very distinct orders of facts. The one is nothing more than an expression of the vital action brought into play for the expulsion of the foetus, while the other is constituted of the successive movements which the child itself executes during such expulsion; the first is purely physiological, the second embraces the mechanical phenomena of the accouchement, and though often confounded in practice, these two orders should be carefully distinguished in theory.

We shall therefore have to examine (in as many separate chapters) the causes and physiological phenomena, as also the mechanical phenomena of a natural labour. Again, although in the vast majority of cases the woman is absolutely able to deliver herself, yet there is a great number of minor precautions which the accoucheur should bear in mind, and a series of little attentions he must give to the patient in the course of the parturition; besides, the child will likewise require his intelligent aid, either during the travail or immediately after its birth, and therefore we shall devote a fourth chapter to the exposition of those attentions and precautions.

CHAPTER I.

OF THE CAUSES OF LABOUR.

THESE have been divided into the efficient and the determining causes.

§ 1. EFFICIENT CAUSES.

For a long time the foetus was regarded as the principal agent of its own delivery, and the advocates of that opinion (which is no longer admitted, except by some persons out of the profession) relied chiefly on the fact of dead children being expelled slower from the womb and with more difficulty than others; and further also because, in certain instances, the child has been known to escape from the uterus some time after the mother's death. But, in reality, these two facts have no value whatever in the question before us; for the death of the foetus, when recent, does not materially retard the parturition, and some writers are altogether in error as to the influence it may then have.

The living infant is expelled more rapidly, not in consequence of being the agent of its own discharge, but because its movements irritate the uterus and solicit its more frequent contractions; and after its death the organ is, on the contrary, deprived of that natural irritant. Besides, whenever the foetus has been defunct for a long time, another cause of retardation is added to the former; that is, where the product of conception has undergone a partial decomposition, the contractility of the uterine walls experiences therefrom a pernicious influence. In fact, the organ's vitality seems to be in relation, to a certain extent, with that of the enclosed body; the blood being no longer changed by the ordinary stimulus, does not reach there in such large quantities as heretofore, and consequently the greater activity usually manifested in gestation is lost; and hence there is an atony of its walls, an excessive feebleness of its contraction, and a slowness of the labour. Again, the foetal trunk, being softened by the mummification before described, caves in, and ceases to offer any longer that resistance to the uterine wall which is necessary to the energy and the maintenance of its contraction. Therefore, if it be true that the death of the infant renders its own delivery more difficult, it is solely from the unfavorable influence that this occurrence may have over the exercise of the organic contractility.

Instances of children having been delivered spontaneously after their mother's death are quite numerous, and this is the strongest argument adduced by those who believe the foetus is the principal

agent. But very many observations, among others those related by Dr. Planque (in *la Bibliothèque de Médecine Choisie*), prove that those infants were even dead before the mother. Now, these facts, extraordinary as they appear, can be very naturally explained in the following way: Supposing the delivery took place shortly after the parent's death, the motor faculty of the uterus is not so dependent on the nervous system as to be entirely lost immediately upon the cessation of vitality in the latter, and this property is evidently retained for some time after the mother has succumbed. Thus, Leroux has observed the uterus contracting for a quarter of an hour after the last breath; and Osiander, after having performed the Cesarean section on a corpse, found the uterus as much contracted the next day as it usually is in a woman just after her confinement. It is, therefore, very natural to suppose that such accouchements are owing to the contractile action of the womb, which the latter, like other hollow muscles, still preserves, says Desormeaux, for some time after death; and finally, let us add, that a real death has in many cases been preceded by an apparent one, and possibly that the former did not occur until just at the instant of, or immediately after the delivery took place. But when the expulsion of the foetus does not occur before the lapse of two or three days, we must suppose, with M. Velpeau, that the labour being well advanced at the time of the mother's death, and gas being rapidly produced in large quantities in the intestinal canal, the uterus is thereby mechanically compressed on its exterior, and the ovum is consequently forced out entire. Perhaps the subjoined case, reported by Hermann, might be explained in that way. (*Edin. Med. and Surg. Journal*, new series, No. vi. p. 431.)

A young woman died in her tenth month, and the third day after, the attendants noticed a strange noise about the corpse. A physician was hastily summoned, who found that twins, still enclosed by the intact membranes, had been just delivered. The children presented no traces of putrefaction, the placenta alone showing a commencing alteration.

But, besides these, numerous other objections still remain against this theory; for instance, the accouchement exhibits nearly the same phenomena, at whatever period of gestation it takes place; now, can any one suppose that the foetus, which scarcely moves at all in the early months, can at once acquire a sufficient degree of strength to overcome the great resistance made at that time by the uterine neck? 2. It is well known that, if the child present by any other part than the head in labour at term, the presenting part is so high up, before the rupture of the amniotic pouch, that it can in nowise contribute to the dilatation of the os uteri. 3. Again, the foetal efforts certainly ought to affect the bag of waters first, and therefore a rupture of the enveloping sac should always be among the earliest phenomena of the labour; however, such a rupture often does not occur until the very last moments; sometimes even the ovum escapes entire. 4. Would it be possible for the most healthy and vigorous infant to make any exertions strong enough to

surmount the resistance opposed to its delivery in some of the instances of tedious labour? etc. etc. From all which we may conclude that the foetus has no influence over its own expulsion, and that the efficient cause of labour evidently belongs to the contraction of the uterine walls, aided by that of the diaphragm and the abdominal muscles.

Furthermore, to be convinced that the womb acts the principal part in this process, it is only necessary to examine a woman during labour, and, more especially, to introduce the hand into the uterus in a case of difficult version. It is its contractions alone which generally produce the dilatation of the os uteri, thus preparing a way for the child's passage; and they also perform the most important part in the later periods of the labour, and in case of necessity they could even complete the delivery themselves. Thus, for instance, the parturition does not the less take place in animals, where the belly is laid open, and the abdominal walls thereby rendered incapable of any further action. It also takes place in women affected with procidentia uteri,* as also in those who suffer from a paralysis of the abdominal muscles in consequence of an affection of the spinal marrow, or some one of the nervous centres.

But more usually, the uterine contraction is materially assisted in the second or expulsive stage of the labour, by the instantaneous action of the diaphragm and ventral muscles; for just at the moment when the head clears the cervix uteri, more particularly when it distends the perineal wall by resting on the floor of the pelvis, and thereby diminishes its thickness, when it presses strongly on the lower part of the rectum and the neck of the bladder, when it dilates and partially opens the vulva, and when it presses on all these parts, the woman gives way instinctively, nay, almost involuntarily, to the most violent bearing down, to rid herself as promptly as possible of this insupportable sensation; that is to say, firmly fixing her feet against the foot-board of her bed, and clinging to anything around that may offer a solid *point d'appui*, the patient takes a full inspiration, dilates her chest, and then, by retaining the inhaled air in her lungs, she strongly contracts all the muscles forming the abdominal girdle. This auxiliary contraction is so evident that nobody can doubt it, and authors only differ as to the kind of aid it brings to the uterine forces. Haller and others consider the uterine contraction as being merely secondary, and they give the abdominal muscles the principal *role* to play in expelling the child; thus they suppose the organ's retraction simply serves to support the foetal trunk, to embrace it properly like a cylinder, and to prevent the great pressure of the diaphragm from crushing it in, while at the same time the act of inspiration and the contraction of the abdominal walls force it outwards. But, from the facts before stated, we may judge of the

* According to the report of Burdach, Wimmer has actually known the labour to take place regularly in a woman whose womb formed a tumor between her thighs, eleven inches long and seven and a half inches broad; the opening in which was directed downwards.

value of this hypothesis. True, in certain cases of excessive feebleness of the uterus, and of a complete inertia of its walls, the abdominal muscles have proved sufficient to terminate the delivery; yet how much oftener has it happened that the woman, exhausted by antecedent disease, and left without energy or strength, has been unable to assist the womb by any voluntary contraction whatever.

Again, some women have been delivered during hysterical or epileptic fits, in a state of total loss both of feeling and movement, where evidently the uterine contraction alone could accomplish it. This harmony of action is therefore useful but not indispensable, since the labour will often terminate under the sole influence of the uterine forces; but it will be nearly always impossible in cases of a total inertia in the organ, whatever may be the violence of the abdominal muscular contraction.

The researches of Cloquet and Bourdon on the physiology of the process do not warrant the supposition of any active pressure from the diaphragm on the upper part of the uterus. They have proved, in fact, that the principal phenomena consist in a change of the acts of respiration; and the object of such change is to furnish a solid point of insertion to the muscles, passing from the chest both to the trunk and upper extremities. When the air has penetrated into this cavity, the glottis closes spasmodically; the abdominal muscles begin to contract; they press back the viscera in the cavity of the peritoneum against the diaphragm; the latter contracts in turn; and, being sustained above by the resistance from the air contained in the lungs, gives to the base of the chest a degree of immobility and solidity, thus creating a fixed point for the muscles inserted there; so that, in the effort of expulsion, the diaphragm, by its contraction, only exhibits a power of resistance sufficient to sustain the thoracic parietes; but not an active force, which is to operate, like the abdominal muscles, directly on the uterus.

On the whole, then, the efficient cause of labour is inherent in the womb itself. The contraction of its walls only is brought into play during all the first half of the accouchement; but it is aided in the last moiety by the abdominal muscles, which become more and more active as the labour draws towards its termination. Most generally the uterine contractions would be sufficient, but the abdominal contraction alone could scarcely ever complete the delivery.

§ 2. DETERMINING CAUSES.

This name is applied to everything that can determine the action of the efficient causes; and, as before stated, this class consists both of unnatural and natural causes. The former have been already studied under the heads of abortion and premature labour, and hence the second only claims our attention here. The regular and almost fixed period at which the gestation terminates in the majority of women, has in all ages claimed the attention of physiologists, though by some the determining cause of labour has been attributed to the child, and by others to the matrix.

According to the partisans of the first opinion, the foetus, having

arrived at a certain stage of development, will have acquired such a degree of muscular power that the resulting movements of its limbs will produce such blows and shocks upon the uterine walls, as will irritate the organ and determine its contraction. 2. The weight of the infant might also lead to the same effect. 3. Being confined in the uterine cavity, whose dimensions have not augmented in proportion to those of the foetus, the latter will be incommoded; suffering from the prolonged accumulation of meconium in the intestinal canal, of urine in the bladder, and from its contact with the amniotic fluids which ultimately acquire aerid and irritating properties, and no longer finding in the materials furnished by the mother the elements necessary to its nutrition and respiration, the infant will experience a necessity of changing its residence, of seeking a medium more suited to its ulterior development; which necessity will prove an instinctive desire of escaping from the surrounding inconveniences, that will cause it to give itself, so to speak, the signal of departure. Surely, it is only necessary to present such reasons as these in a summary manner, to obviate the necessity of refuting them; whence the foetus is as foreign to the determining as to the efficient cause of labour. The opinion favorable to the cause residing in the uterus rallies around it a greater number of partisans, but all of these do not explain the mode of action in the same way. Thus, agreeably to some, the womb only possesses the faculty of distension to a certain degree, and, when carried beyond that limit, the walls react and contract; others believe that the term of nine months is assigned by nature as the complement of the womb's new organization; and having acquired at that period all the qualities necessary to the accomplishment of the great function to which it is destined, it immediately enters into action. But most of the modern accoucheurs consider the following explanation as the more reasonable :—

Observation proves, say they, that the fundus and body of the uterus are the parts first distended, for the purpose of forming the cavity which encloses the product of conception; and the cavity of the neck subsequently participates in the dilatation, beginning at its upper part, then gradually descending, so that the ring formed of the external orifice has alone undergone but little alteration at the approach of labour. Again, the walls of the neck, whose tissue is denser and more resistant than that of the body, undergo certain changes, which follow the same progression in dilating as the cavity does; their tissue is saturated with juices, hence they soften and become supple; their fibres unfold (as it were), are elongated and developed; and, consequently, the neck's resistance to the escape of the ovum progressively diminishes as the term of gestation draws near.

According to this view, the fibres of the neck are considered antagonistic to those in the body, the contraction of which latter is therefore reduced to a simple tonic action, so long as the neck's resistance is superior to their power; but when this opposition is diminished by the neck's successive dilatation, the orifice alone remaining, the fibres of the body then begin to act more evidently,

and their contractions become more and more energetic. (*Dictionnaire de Médecine*, en 25 v.)

According to Ant. Petit, the body only will dilate prior to the sixth month; but at that period it commences borrowing from the cervical fibres the elements of its ulterior distension, to which it can no longer contribute itself; and such contributions will continue to be drawn during the last three months, and then, when all the fibres held in reserve by the neck shall have yielded, the distension being carried to the utmost, the accouchement will take place; and Velpéau adopts nearly the same opinion. On the other hand, M. P. Dubois, who originally advocated the opinions avowed by Desormeaux in the first edition of the *Dictionnaire*, has since taught, in his course of 1837-8, the following theory proposed by Jones Power, in 1819.

The uterine tissue at term may be justly compared to that of the other hollow muscular organs, the bladder or rectum, for example; and, like these organs, it is formed of two muscular layers, the external of which has longitudinal fibres, and the internal has circular ones; it also presents a superior cavity, a dilatable and contractile reservoir, to which the structure just indicated principally belongs; as also a closed orifice below, formed solely by the circular fibres arranged as a sphincter muscle. It likewise resembles the bladder and rectum in having two orders of nerves—the sympathetic and the spinal; those coming from the ganglionic system are distributed to the body, while the others, derived from the nervous centres of animal life go to the neck, which is a true sphincter for the uterus; the similitude is further maintained by a membrane lining its interior, and by being covered externally (though at the superior part only) by the peritoneum.

The agreements in structure are not the only ones claiming our attention; for the well-marked sympathies existing in the rectum or bladder, between the reservoir and its sphincter, are found quite as distinctly marked between the uterine body and its neck; and hence, if an irritation of the neck of the bladder or the sphincter ani is capable of producing an urgent desire of urinating, or of going to stool, any irritations affecting the cervix uteri must equally solicit the contractions of that organ; moreover, it is well known that an extreme fullness or distension of those first-named organs, acts mechanically in two ways: 1. By irritating their walls by the direct contact of the contained substances; 2. By dragging or pressing on the fibres forming the sphincter, and these latter reacting on those of the body. Now, who does not recognize in this resemblance, says Dubois, an easy explanation of the determining causes of labour? For, so long as the cervix uteri retains a certain length, its most inferior fibres, those especially supplied by the nerves of animal life and therefore enjoying a high degree of sensibility, are not exposed to any kind of excitation; but when, towards the end of the gestation, and in consequence of the successive expansion at the superior part of the neck, its whole length has disappeared by

contributing to the organ's gradual development; a circular collar alone remaining, formed of the horizontal and the circular fibres, which appertain to the external orifice; and the growth of the uterus cannot continue without producing a severe tension on the fibres of this pad; and further, being brought immediately into contact with the amniotic sac (and consequently with the presenting part of the foetus), they must necessarily suffer, must be irritated and urged on by this continual presence, to which they are unaccustomed; and, as this double cause of irritation is constantly renewed, it must inevitably happen with the fibres belonging to the body of the uterus, as it does with the rectal and vesical walls when their sphincter is irritated, i. e., they must immediately enter into contraction.*

I shall content myself with simply presenting the principal views that have been entertained, as to the determining cause of labour, although it would be an easy matter to start numerous objections against all of them, which perhaps could not be set aside; but having no new theory of my own to propose, I will only remark that the last three are established on a false basis: namely, a progressive diminution of the neck by an expansion of its superior part, commencing at the sixth month (*vide Pregnancy*). No one of them, therefore, is entirely satisfactory; and it is certainly the part of wisdom to say, with Avicenna, that "*at the appointed time the labour will take place by the grace of God!*"

CHAPTER II.

OF THE PHYSIOLOGICAL PHENOMENA OF LABOUR.

FOR the purpose of facilitating the study of the phenomena of labour, most writers have divided them into several distinct groups, which they have denominated the *stages* of labour, and each one has

* Mr. Power cites the following case, communicated by his brother, in support of his opinion, which we again bring forward as being interesting in many respects.

A lady, the mother of several children, supposed herself near the term of a fresh pregnancy, and she felt two or three slight pains; but they soon passed off again, and three months more elapsed without her experiencing any other pain. Becoming uneasy about her condition, she consulted several physicians, who, after having made the usual examination, declared she was not pregnant. The author's brother having been called in, participated at first in the same opinion; nevertheless, he found the abdomen greatly enlarged, and much inclined forwards; in fact, it descended in front of the thighs, almost down to the knees, when the patient was standing. A distinguished physician, a friend of the lady, who was present, then mounted on a chair above her, and by passing a towel underneath the belly raised it up; the vaginal touch being once more resorted to, the child's head was distinctly felt. A suitable bandage retained the tumor in that position, and four or five days afterwards the pains came on, and the woman was happily delivered of a very large living infant.

built up his own classification, so that we may now enumerate some twenty or thirty different systems; but of all these, the division of Desormeaux appears to us the most simple, and we shall therefore adopt it. His first stage extends from the beginning of the labour to the complete dilatation of the cervix uteri; the second includes all the interval from this time until the child is expelled; and the third embraces the delivery of the placenta.

Precursory Signs.—The term of gestation is most usually announced by a collection of symptoms, to which the majority of authors have applied the name of the “precursory signs of labour.” Thus, during the last fortnight of pregnancy, sometimes a little sooner, at others, only five or six days before the delivery takes place, the uterus, which previously extended up to the epigastric region, sensibly sinks lower, and seems to spread out laterally; and the mechanical obstruction to the respiration being thus removed, the latter becomes more free; the stomach is no longer compressed, and digestion, if hitherto impaired, becomes more easy; the patient, no longer troubled with nausea and vomiting, and respiring more freely, becomes, it is said, gayer, more cheerful, and disposed to movement. However true this last proposition may be with regard to some women, it certainly does not apply to all; but, on the contrary, it has seemed to me that in proportion as the term approaches their position becomes more and more distressing; and this, I think, may be easily explained; because if the respiration becomes more free, and the fundus uteri descends, the inferior part of the organ must also sink down in the same ratio; and the head (when presenting) engages in the excavation, and pushes the lower portion of the uterus along before it; it sometimes even reaches the pelvic floor, and consequently gives rise to an annoying sensation of weight about the fundament, to great pressure on the cervix vesicæ and rectum, strainings at stool, ineffectual desires to urinate, vesical tenesmus, dysury, and sometimes even to strangury; the œdema and varices of the inferior extremities and genital parts then augment considerably; the hemorrhoidal vessels swell up, and the tumors of a similar name, if they existed before, become more voluminous and very painful, and at the same time copious glairy discharges escape from the vulva.

About the same period the pelvic articulations become softened, the gliding of their surfaces being rendered easier, the joints are more movable, and consequently the progression is uncertain, painful, and sometimes even impossible. Lastly, to all these inconveniences and pains, another is often added, which singularly aids in making the woman’s condition still more distressing; it is this—the uterus, in the last periods of gestation, seems, by its contractions, which are short and distant at first, but soon increasing both in length and frequency, to prepare, as it were, for the more violent contractions of parturition. Indeed, she often experiences the true pains from time to time, and should the accoucheur then examine the abdomen, he, like her, will feel it hardening, and the uterus

manifestly contracting. At times, these contractions are scarcely painful, since they do not operate throughout, and then they can only be detected by placing the hand upon the abdomen.

We know that the uterine globe is contracting from its greater hardness, for, after a short time, a relaxation occurs, and the walls regain their habitual suppleness.

In women who have previously had children, we may ascertain by the vaginal touch (if the internal orifice is properly dilated), that the membranes bulge out during contraction, and engage slightly in the upper part of the cervix uteri. These precurssory phenomena are manifested much sooner in primiparae than in others.

According to certain writers, the pains are felt first, and with more severity than at any other time, about four weeks before term; and this is so true that some women, who have been pregnant before, do not hesitate to affirm, then, that their labour will take place in the course of a month. (*Burdach.*)

Further—these pains are not wholly useless, for they contribute to the diminution of the neck, and generally bring on a commencement of its dilatation; thus, I have remarked that, when no cause of dystocia existed, the labour was usually much more rapid in those females who had been thus tormented by frequent pains during the last fortnight of their pregnancy.

On the whole, therefore, contrary to the proposition reiterated in all the classical works, that *women are more gay, cheerful, and disposed to action*, I have observed that they are in general more sad, and are greater sufferers, than at other times; and although they appear to endure their distresses better, it is simply because they are encouraged by the hope of a near accouchement, the primary announcement of which is recognized in the very sufferings they endure.

First Stage.—But the term of gestation finally arrives, and the labour begins. In primiparae, this fact is made known by an opening of the neck, which until that time had remained closed; though, in other women, by the total effacement of the rounded collar made by the os tincæ. The pains just mentioned as occurring in the last fortnight of pregnancy, then become more acute and frequent, and during these pains the abdomen retracts, and the uterus hardens, as may easily be verified by examination. If the fundus was heretofore inclined towards the right or the left, it will now correct the obliquity, and return to the median line; the inequalities of the foetus can no longer be perceived through the abdominal wall; the cervix uteri, which is already somewhat dilated, retracts during the pain, and its margins are tense and resistant, though growing thinner; the membranes are stretched, pressing at first on the neck, then engaging, as soon as the dilatation is sufficiently advanced, under the form of a spherical segment, whose dimensions progressively increase with the dilatation.

The organs of generation are more humid; the glairy discharges are streaked with blood; the pains go on augmenting in force and

frequency of repetition, each one being ushered in by a slight shivering, or horripilation; while it lasts, the pulse is hard, frequent, and full; the countenance is flushed, the surface and tongue dry, and the patient much changed; nausea and vomiting often come on; she weeps, despairs, and becomes quite irritable, and, being unconscious of the progress of her labour, because no advance is perceived, she cries out at every moment "I am going to die; oh doctor, I'll never get over it." Then, after the contraction, she is less agitated; still, however, the cessation of the pain does not seem to be perfect, the calm is not yet complete, and the poor sufferer, still under the influence of the last pain, dreads incessantly the arrival of its successor. During the interval, the margins of the os uteri again become supple, thick, and rounded; the membranes that were smooth and tense, while the pain lasted, are now flaccid, and hang in folds, and the foetal head, which was temporarily removed from the orifice, seems to return, and becomes much more accessible to the finger. In proportion as the contractions are repeated, the os uteri gradually dilates more and more, until at last it is completely opened; the cavity of the uterus and the vagina thenceforth forming but a single uninterrupted canal.

Some females are able to conceal these early pains, but most of them find it impossible to do so for any length of time; for, if conversing, they will at once leave the phrase incomplete, and remain silent until the pain has diminished, or stopped altogether; or, if they happen to be walking up and down the chamber, they stop short and lean on a chair, or the first article that comes to hand, until it passes over.

Second Stage.—At length, under the influence of those primitive pains, the duration of which is very variable, the orifice becomes enlarged, and it forms a sufficient opening; and from that moment all the uterine forces are directed to the expulsion of the foreign body found enclosed within the organ; for, up to this time, the uterus alone was concerned in dilating the neck, but it now seems to call in aid the contraction of the abdominal muscles, and consequently both the pain and the bearing down are carried to a much higher degree. The heat of the surface is much more considerable, the agitation extreme, and in some instances there is even a marked disorder in the intellectual functions. The pains are stronger, and the intervals shorter; nevertheless, the woman bears them with more patience, nay, she even assists them by voluntarily contracting all the muscles of the trunk; and each pain is followed by a calm more perfect than that in the first stage. Indeed, when the interval is somewhat longer, some females, exhausted by the previous fatigue, sleep profoundly, and thus get a refreshing repose that should be respected; but which is soon interrupted by a new pain. The inferior segment of the membranes gradually engages in the orifice; the successive and repeated contractions cause the liquor amnii to flow towards this point; the amniotic pouch becomes tense and bulging at its lower part, and, being deprived of all sup-

port from the parietes of the neck, it gives way, and the contained waters escape with more or less rapidity and abundance, according to circumstances.

In a short time, the foetus, being pressed on by the same contraction, applies itself to the os uteri, and the head (if that is the presenting part) engages like a stopple in the orifice, thereby preventing a further discharge of the waters. The head is then said to be *at the crowning*. The rapid discharge of a considerable quantity of the waters, which then takes place, suspends the uterine contractions for several moments, and, as the head no longer presses on the circumference of the neck, a small amount of fluid constantly oozes out. But a more energetic pain shortly comes on, by which the child's head advances and clears the circle of the uterine orifice, and just at this moment the patient very frequently gives a loud cry, an expression of the excessive suffering caused by its passage. Next, the head descends into the vagina, the transverse folds of which become effaced, the canal enlarging and elongating for its reception. When a rupture of the membranes takes place before the os uteri is completely dilated, the head often descends to the pelvic floor (but always retained in the womb), and does not clear the uterine orifice until it engages in the inferior strait; though, whichever happens, the pains go on increasing in violence. Each one is announced by a general shivering; the patient clings to anything around her, supports her feet against the mattress, throws the head backwards, takes a deep inspiration, and violently contracts all the muscles of her body. The foetal head, being thus forcibly urged on, presses against the floor of the pelvis, and causes it to protrude at every pain; and the consequent pressure on the rectum gives rise to the most urgent desires of going to stool.

After a greater or less resistance, the perineum at last yields, becomes distended and bulging in front; the vulva partially opens, the nymphæ are effaced, and the skin in the neighborhood contributes to this enlargement; the head then appears in the dilated vulva, and the feces as well as the urine are passed involuntarily, when the pain again ceases; the head, just apparent, now seems to re-enter the excavation; the over-distended perineum resumes a normal state, from its own inherent elasticity; the labia externa approach each other, and the vulva again closes up; but, at each pain, the latter opens more and more, then retracts, until, at last, all these parts, from the force of the repeated contractions, become incapable of any further resistance;* finally, a horrible pain comes on, forcing loud cries from the woman, which is made up of two others of unequal violence, for which nature seems to have reserved

* Certain authors attribute the retreat of the head after each pain to a winding of the cord around the child's neck, and therefore propose various measures for facilitating its delivery. But this simply results, says Baude-locque, from the elasticity of the perineum and the reaction of the muscles contained in its substance, as also from the elasticity of the cranial bones. Consequently, we have nothing to do but to await the spontaneous expulsion.

all her powers: this first brings the parietal protuberances to a level with the tuberosities of the ischium, and then expels the head altogether from the parts.

In some instances, the delivery of the body immediately follows that of the head; but in the larger number, some seconds elapse; then the pain is renewed, the uterus again contracts and drives out the foetal trunk, together with the rest of the amniotic liquid.

The rapid sketch of these phenomena, just given, has not afforded us an opportunity of dilating upon any; notwithstanding, some of them ought to be studied more carefully. For instance, the pain, the dilatation of the uterine orifice, the glairy discharges, and the rupture of the membranes, demand a more particular attention. We shall, however, be brief in the physiological considerations appertaining to each.

§ 1. THE PAIN, OR CONTRACTION.

In most females, the pain is so inseparable from the contraction, that, in common language, the cause is readily confounded with the effect; and the two expressions are used, indifferently, to express the uterine contraction, its returns, duration, weakness, and intensity. We must remark, however, that although the intensity of pain is generally in relation to the contraction, yet it is not always so, for the perception of pain thereby produced necessarily varies with the susceptibilities of the patient herself. Some experience trifling pains very acutely, and express themselves freely; others, on the contrary, whose sensibility seems more obtuse, scarcely complain at all of the strongest contractions (*vide page 99*). Again, there are certain females who have the happy privilege of being delivered almost without any or at least but very inconsiderable ones. For instance, I had an opportunity of observing a young primipara at *la Clinique* who was aroused by the pains at four o'clock in the morning, and was delivered at six; she suffered so little during these two hours, that she did not consider it necessary to alarm any one, and the midwife was only summoned when the pain became a little more severe; she soon arrived, and found the head delivered. This case was still more remarkable, from the fact of a partition existing in the vagina, which divided its cavity into two parts; indeed, it had been proposed to incise this septum when the hour of labour should arrive.

It is highly probable that the dilatation of the neck goes on quietly in such cases, under the influence of contractions which are not perceptible to the patient from being unattended with pain. The pains have received different names according to the period of their occurrence; thus, the trifling ones appertaining to the precursory phenomena of labour are named *mouches*, from a comparison with the sensation caused by the pricking of that insect; those of the first stage, in which the neck is dilated, are termed *preparative*; those of the second are designated as the *expulsive*; and finally, in the last moments of labour, when the head forcibly distends the perineum

and partially opens the vulva, the pains are so violent in character as to have been denominated the *conquassantes*.*

The pains are felt in the lower part of the abdomen; and, in the early stages, generally follow a line drawn from the umbilicus to the second bone of the sacrum, but when the head presses against the pelvic floor they run more towards the coccyx. Sometimes they are felt in the lumbar and sacral regions only; the women then call them the pains of the loins; and the patient has good cause for dreading these latter, for they do not much advance the delivery, and they always leave behind them a distressing condition. These particular pains often come on early in the labour, at other times a little later, but they rarely continue till its close; sometimes they coincide with a well-marked obliquity of the uterus. Again, according to Madame Lachapelle, they may generally be referred to too great a rigidity of the external orifice, either because this experiences a kind of cramp, or, owing to its hardness, it suffers more during the contraction than when more softened.

These lumbar pains doubtless depend on the sensibility of the orifice, and this can readily be explained by the origin of the nerves distributed to the neck, for the hypogastric and lumbar plexuses furnish them; whilst the ovarian plexus of the splanchnic nerve alone sends its branches to the fundus uteri. Various plans have been tried to assuage those pains; thus, venesection, emollient injections, and the opiates, have often succeeded, but there is one, which of itself may suffice in many cases in relieving the patient; that is, to raise her up by passing a towel under the loins. The pains have been divided by writers into the true and the false, according to whether they are produced by a regular labour, or by some disorder in the uterine functions; but as we shall endeavor to establish the diagnosis carefully, further on, we will only remark now, that a true contraction always commences in the fibres of the neck, and only reaches the fundus some seconds afterwards; and, therefore, every contraction beginning at this latter part is irregular and abnormal.

The question now arises, what is the cause of the labour pain? Some suppose that it is produced by the tension on the fibres of the neck, others by the pressure on the nerves distributed to the internal surface of the organ, which are necessarily compressed by the foetal walls during the contraction; and lastly, certain accoucheurs have thought that it was owing to the compression of the parts contained within the pelvis, the nervous plexuses, for example. But all these opinions err, in being too exclusive, for the whole of those causes evidently contribute to the production of pain; indeed, there can be no doubt that the dilatation of the neck is painful during the first stage of labour, more especially when the head is clearing it; in fact, according to Madame Boivin, that will be almost the only source of suffering; though, on the other hand, when the child is so

* I give those terms (*mouches* and *conquassantes*) as found in the original, because, in our American practice, they have no synonymes; perhaps the words *pricking* and *tearing* would express their sense.—[Translutor.]

placed that it neither rests against the uterine orifice, nor yet on the superior strait, the contraction is still painful; and it must then be owing to the pressure on the nerves in the body of the womb. Again, in the last moments of parturition, when the head is passing the inferior strait, the perineum, and vulva, the enormous distension of those parts, and the pressure on each of them, must singularly add to the pain produced by the contraction, as well as contribute towards giving it that particular character known under the name of the *conquassante*, or tearing pain.

Still another question has been agitated by physiologists, that is, why is the contraction intermittent? and here far-fetched reasons have been sought after for the explanation of a very simple phenomenon; just as if any single muscle of the economy could contract permanently; as if it were not the nature of all muscular contraction to be interrupted by the fatigue, even of a too prolonged exercise, and as if it must not have an interval of repose, in order to keep up its activity.

It is certainly very curious, to study the influence of the contraction over the mother's circulation, which exhibits, according to Hohl, the following peculiarities during a pain: In general, the pulse is accelerated as soon as the contraction begins, increasing in frequency as it goes on, then diminishing, and gradually resuming the normal type. Now there exists so intimate a relation between these two phenomena, that, where the pulse is gradual in its acceleration, where it arrives little by little to the maximum of its rapidity, is there sustained for a certain length of time, and finally recedes by degrees, the pain also follows an equally regular course; it attains step by step its own point of intensity, remains a while stationary, and then decreases with the same regularity; but, on the contrary, if the pulse accelerates by jerks, the contraction will be short and precipitate, and therefore without effect. Hohl ascertained this regularity in the phenomena, by counting the pulsations by quarters of a minute during the whole time a pain lasted. For instance, he noted the following variations in a contraction which lasted two minutes :—

First minute.	{ First and second quarters, each	18 pulsations.
	{ Third quarter	20 "
	{ Last quarter	22 "
Second minut.	{ First and second quarters	24 "
	{ Third quarter	22 "
	{ Last quarter	18 "

Again, in proportion as the labour advances, the pulse accelerates the more; so that, a little while before delivery, it has the same frequency in the intervals as it had at first during the strongest contractions. We have already pointed out the modifications in the bruit de soufflet, noticed by the same observer during the pain (*vide* page 131), and shall not repeat them now, merely remarking, however, that they are sufficiently well-marked to recognize the uterine

contraetion, even when the woman herself may be desirous of concealing it.

§ 2. DILATATION OF THE OS UTERI.

The foetus evidently has no part in the dilatation of the os uteri until the bag of waters is ruptured; and it is not until after this event takes place that the vertex, by engaging like a wedge in the uterine neck, can hasten the dilatation mechanically; and it is equally evident that, in any other than a vertex position, the presenting part being even more voluminous and irregular than the head, cannot perform the same office, and therefore, *exteris paribus*, this will occur more slowly. Hence, it is not the foetus, at least in the greatest part of the labour, which is the effient cause, but here also the phenomenon is referable to the contraetion of the uterine fibres.

Now, in order to realize this fact, we must remember, say Desormeaux and P. Dubois, that the walls of the womb are applied to an ovoid body; that the longitudinal fibres are the most numerous, and that the circular fibres of the cervix, although capable of stoutly resisting their power, yet are gradually constrained to yield to the action of the longitudinal ones; and if we now imagine these latter fibres to actually enter into contraetion, we shall readily comprehend that, being unable to diminish the distended uterine cavity, all their power must be exerted in drawing upon those points of the circle which form the orifice, where each one is inserted, and thus remove them from the centre of the opening. Wherefore, every portion of the orifice being equally operated upon, it will present a circular form; but if the foetus is placed transversely, and the womb dilated in that direction, the fibres being retracted more in the same diameter, the orifice will be elliptical.

The rapidity of the dilatation bears a direct ratio to the force and frequency of the contraetions. In general, it is very slow in the commencement of labour, but much more rapid towards its close; for instance, if the opening dilated to the extent of one inch in four hours, it would only require two, or at most three hours for its complete enlargement; this progresses more slowly, however, in primiparae than in other women. Again, the softness, or the rigidity and tension, of the neck during the intervals of pain, have a great influence over the rapidity of its dilatation; and the same may be said of the obliquity of the orifice; for when this latter is carried in front towards the pubis, or what is still more frequent, is strongly directed backwards and looks towards the sacrum—in either case, the neck is no longer placed in the axis of the contraetions, and the head is forcibly pressed towards some part of the uterine wall, against which all the expulsive force is lost.

It is likewise important to bear in mind, that the neck's posterior obliquity may be owing to an anterior inclination of the womb, and may also exist without the latter being at all changed from its normal position, which results from the head having been engaged a long time in the excavation, and having pushed the anterior-inferior uterine wall before it; whilst the os uteri was simultaneously carried

upwards and backwards. The orifice, which is generally very thin in primiparae at the beginning of labour, becomes thicker towards the last half of the first stage; then it gets thinner, and, finally, it forms a thick, rounded collar, which the head pushes before it as far as the inferior strait.

The reason of those various changes, says M. Guillemot, is very simple; for the pressure upon the neck acts more forcibly on the periphery of the orifice than on any other part, and the consequent thinning will disappear as soon as the uterine circle yields, and is carried back towards the parts that have not suffered an equal pressure, but have still maintained their thickness; though soon after, in consequence of fresh pains, the tension on this new circle will destroy its bulk and reduce it to the condition named. Finally, a period arrives when the neck maintains its thickness, notwithstanding the dilatation it undergoes, because the uterine fibres, being excessively shortened, give more density to this part. I will add that the thickness of the anterior lip is often greatly augmented when the engagement is far advanced, by the oedema of the part, owing to its compression between the head and the symphysis pubis; and further, that it is not at all uncommon to find the posterior lip quite thin, whilst the anterior one still retains a certain degree of bulk.

§ 3. OF THE GLAIRY DISCHARGES.

We have already learned that an abundant secretion takes place in the vagina during the latter periods of gestation; but when the labour sets in, this secretion augments very considerably, and some viscid mucosities resembling the white of an egg designated as the glairy discharges, flow from the womb and vagina. In some women they become sanguinolent at the approach of the travail; but in others they are only so during that function. When blood is thus mixed with the other fluids, it is said to be an evidence that the dilatation of the orifice is advanced; but this, however, is not always true, since, in some instances, several days elapse before the commencement of parturition. In fact, in some cases they are wholly absent, and the labour is then said to be a *dry* one; the genital parts experiencing a degree of heat and dryness almost akin to inflammation.

With regard to their origin, these discharges are not, as Ant. Petit, and Baudelocque supposed, the product of a transudation of the amniotic waters through the pores in the membranes; but they simply result from the more abundant secretion of the mucous cryptæ in the neck and vagina: a secretion which is augmented by the greater irritation in those parts, caused by the labour. As to the blood that colors them, whether before or during the *travail*, it may come either from some petty laceration in the borders of the orifice, from a rupture of some of the minute vessels which run from the internal uterine surface to be distributed upon the membranes, or from the detachment of a small portion of the placenta, or, agreeably to Desormeaux, it may be poured out from the exhalant mouths of the capillaries without any rupture whatever.

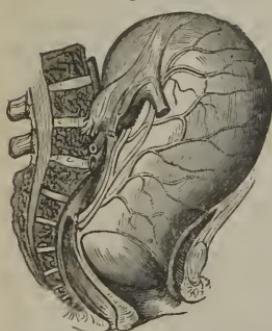
These mucosities, commencing as we have before seen in the early weeks of gestation, serve to lubricate the genital passages, and while relieving the vaginal walls and the parietes of the neck of their engorgement, they have the further advantage of moistening those tissues, of softening the perineum and the vulvar orifice, and thus rendering the extreme distension which all these parts must shortly undergo, more easy. Their abundance is always to be considered a good sign, presaging a prompt dilatation and an easy expulsion.

§ 4. OF THE BAG OF WATERS.

As the neck progressively dilates, the foetal membranes present and become engaged therein, forming a tumor of variable size in the vagina, which is tense at the moment of the greatest contraction; and this is what is understood by the formation of the bag of waters. Of course, the sac varies in its shape with the figure represented by the uterine orifice; it is generally rounded and hemispherical, though ovoid when the cervix uteri dilates more in one diameter than another; when the membranes are formed of a loose, uncontracted tissue, and especially when they contain but a small quantity of liquid, they may elongate like a *pudding* in the vagina without being a necessary sign of a presentation of either the hand or the foot, as some have incorrectly supposed.

We must acknowledge, however, that the bag of waters is usually less voluminous in vertex presentations than in others; and consequently, that a very great protrusion of it nearly always announces an unfavorable position; and hear what Madame Lachapelle says on this point—"I do not fear the flat sacs; for as soon as the pain ceases the tumor disappears, the fluid that formed it re-enters the uterine cavity, and the flaccid, relaxed membranes hang in folds."

Fig. 52.



The form of the bag of waters when the os uteri is fully dilated.

The formation of the sac is easily understood; thus, by contracting, the uterine cavity is gradually diminished, and the amniotic liquid, pressed on all sides, naturally flows towards the point that offers the least resistance, and such point is evidently the opening in the neck where no walls are found. The reason why so much difficulty existed in comprehending how the membranes could project into the vagina under the influence of this pressure of the liquid, was because the amniotic cavity was supposed to be distended to the utmost by the waters, and consequently that there must either exist a very great extensibility of those membranes, or else a

transudation of this fluid through the ovum's walls; but both hypotheses are false. For it is only necessary to palpate the abdomen of a pregnant woman, and depress its parietes, to become satisfied that in most females a very slight pressure will be sufficient to flatten the ovum, whether in its vertical, transverse, or antero-posterior

diameters; and the same fact is observable in labour, excepting that the ovum can only elongate below, on account of the uterine pressure upon all other parts, and this is what causes the amniotic tumor.

But when the dilatation is completed and the contraction is energetic, the inferior part of the membranes being no longer supported, soon yields to the impulse, and becomes ruptured, thereby permitting a variable quantity of liquid to immediately escape. Where the pouch is voluminous, and gives way just at the moment of a strong pain, the rupture takes place with such a loud noise, that women in their first labour are often much alarmed, and then also the waters gush out in large amounts. But where the pouch is flat, and only a small quantity of fluid is interposed between the head and the membranes, the latter are lacerated without any noise, and but little liquid oozes out after their rupture; because, the head by engaging at once in the os uteri obliterates it completely and blocks up the waters.

In the vast majority of cases, the membranes are lacerated on that portion of the bag corresponding to the uterine orifice. But sometimes the rupture occurs much higher up; and this fact, which is almost inexplicable in the present state of our science, should nevertheless be known, because it accounts for the circumstance of the ovum's inferior segment being then found intact after the discharge of a certain quantity of water, and of our having to puncture the membranes subsequently in this part. Sometimes they are ruptured in the beginning of the labour, which is thereby usually rendered longer and more difficult for the mother, as also more dangerous for the child, especially when a considerable quantity of water escapes at the same time. Besides these varieties, I have several times noticed a remarkable peculiarity that seems to have escaped the attention of practitioners generally, I allude to the occurrence of a rupture before any contraction of the uterus whatever, which constitutes in a few females the first phenomenon of the labour; but the pains do not come on for some time afterwards, occasionally not for several hours. Now this premature laceration has seemed to me to be coincident with a presentation of the vertex that is deeply engaged in the excavation; for although the patient felt no previous pain, and even in certain cases was sleeping profoundly when the waters escaped, it is highly probable that the uterus had already been contracting for some time, and the fact alluded to may be referred to those non-painful contractions hitherto described; unless, perhaps, it may possibly depend on an excessive distension of the amniotic pouch.

At times, the membranes are very hard, thick, and resistant, the rupture only taking place at an advanced stage of the labour, when the head clears the vulva, for instance; or it may occur in a circular manner, and the head escape covered by a kind of hood. The child is then said to be born with a *caul*, and the vulgar, from that circumstance, prophesy a *happy future*.

The infant may even be born hooded, where a rupture of the

membranes first occurred at a more elevated point, one not corresponding at all with the uterine neck, and should the head thus push before it a portion of the amniotic pouch, some serious accidents might result in consequence; for instance, this tardive rupture might delay the travail, or the tension experienced by the membranes, extending to the placenta, may cause its premature detachment, more especially when it is inserted on the sides of the organ, and thus produce a uterine hemorrhage.

In ordinary cases, the rupture takes place at the commencement of the second stage.

The subjoined is a statistical summary made by Churchill, at the Western Lying-in Hospital during the years 1841 and 1842, which will enable the reader to judge of the varieties that may be met with.

The period elapsing between the commencement of the labour and the rupture of the membranes has been noted in 984 cases. Thus,

In 167 females, this time was	2 hours.
" 335 "	" from 2 to 6 "
" 165 "	" 6 " 10 "
" 113 "	" 10 " 14 "
" 71 "	" 14 " 18 "
" 33 "	" 18 " 22 "
" 46 "	" 22 " 26 "
" 23 "	" 26 " 30 "
" 8 "	" 30 " 38 "
" 9 "	" 38 " 40 "
" 4 "	about 50 "
" 2 "	" 60 "
" 4 "	" 70 "
" 3 "	" 80 "
" 1 "	" 105 "
<hr/>	
984	

The same observer noted the time from the rupture of the membranes until the child's birth, in 812 cases.

In 396 women, this time was	1 hour.
" 142 "	" 2 hours.
" 120 "	" 4 "
" 50 "	" 6 "
" 34 "	" 8 "
" 17 "	" 10 "
" 26 "	" 15 "
" 11 "	" 20 "
" 9 "	" 28 "
" 4 "	" 35 "
" 1 woman,	" 40 "
" 1 "	" 50 "
" 1 "	" 120 "
<hr/>	
812	

§ 5. OF THE DURATION OF LABOUR.

The duration of labour is exceedingly variable, even when no obstacle opposes its natural course. Some women are delivered in an hour or two, whilst others are not for several days; and between these two extremes, there is every intermediary grade.

In general, it is longer in primiparæ than in others; and this difference is particularly owing to the resistance on the part of the perineal muscles, which is much greater in the former, though it is also influenced by the dilatation of the neck, which is much slower in them than in the latter.

The whole length of their labour is usually from ten to twelve hours, but it should be known that, in at least one case in five, the travail may not terminate under fifteen, eighteen, or even twenty hours, and this without any injury whatever resulting either to the mother or the child. But, in their subsequent pregnancies, the patients are delivered much sooner, only suffering, in ordinary cases, about six to eight hours. According to Alph. Leroy and Velpeau, the pains are apt to observe periods of six hours—that is, the labour lasts either six, twelve, eighteen, twenty-four, or thirty hours; and possibly this observation may be correct, but I think it will be found subject to very numerous exceptions.

But, supposing the parturition has really commenced, can we predict the hour of its termination with any degree of certainty? This question, which is nearly always addressed to the accoucheur, is oftentimes a very difficult one to answer, for habit alone can enable us to judge by the dilatation, or the suppleness of the neck; by its tension, its hardness and resistance; by the frequency and intensity of the pains; by the time it has already existed, and by the greater or less opposition from the vulva and perineum, of the probable length of the labour.

It must also be remembered, in regard to the duration, that the first stage of labour is to the second, as two, or even three, to one; and, further, this difference is still more marked in women, who have had children, than in primiparæ; and that the first half of the neck's dilatation is much slower than the second. But how many exceptions are there to this law! For instance, the dilatation is sometimes regular, and sufficiently rapid, everything seeming to promise an easy and a prompt termination; yet all at once the pains become feeble and languishing, and our art is often obliged to interpose in aid of the uterine contractions; while, on the contrary, it not unfrequently happens, that the neck is expanded with an excessive degree of slowness, but nevertheless, a few moments will suffice to complete the child's expulsion.

The form of the vagina, according to Wigand, should also be taken into consideration, in making a prognosis as to the probable duration of the labour; thus, if this canal is large throughout, the whole time will be short; and, on the other hand, the dilatation of the cervix, and the infant's expulsion will operate very slow, should the vaginal cavity be narrow, and be regularly contracted throughout its whole extent; again, if the vulvo-uterine canal is large and spa-

cious superiorly, but diminished and restricted near the external orifice, the first part of the labour will be prompt, but the last slow and difficult; and, finally (though more rarely), if its upper extremity is very narrow, the inferior being at the same time largely dilated, we may conclude that the parturition will progress slowly at first, but will then terminate speedily.

It is a very singular fact that a hereditary influence is sometimes felt here, since it is not at all uncommon to find the same characters in parturition during three or four successive generations; the mother, the daughter, and the granddaughters being remarkable either for the slowness or the rapidity of their accouchements.

In general, it is impossible to predict with any degree of certainty the hour of its termination; yet most people seem to imagine that the physician is bound to give the most particular information on this point; but he must always be very guarded in his replies, for if the labour were to overrun the fixed time by some hours it would give rise to the most anxious solicitude, and it is therefore prudent not to be too precise; thus, when such questions are addressed to me, I am in the habit of saying, that, if the contractions are regular, and no accident occurs, if, in a word, all things go on right, the delivery will take place at the hour I name.

In fact, it is absolutely impossible to foresee all that may happen; because, in certain cases, the dilatation of the os uteri, which, perhaps, only amounted to one inch after five or six hours of labour, is at once fully completed; and, at other times, this process being very little advanced, the margin of the orifice is lacerated under the influence of a strong pain, and the accouchement is effected, perhaps, just as the physician has announced that the labour will still last for several hours, as occurred in the following case:—

In examining a young woman, enceinte for the first time, I found the orifice dilated, nearly as large as a two-franc piece, and, supposing that the labour would still persist for some time, I withdrew, but scarcely had I reached the foot of the staircase, when a messenger came running after me in great haste; I immediately returned, and found the head on the point of clearing the vulva, which was already considerably opened; and after the accouchement was over, I ascertained that the whole left side of the neck's vaginal portion had been lacerated. On the other hand, I do not believe that the woman's age has that unfavorable influence over the duration of the labour, even in primiparæ, which is accorded to it by most authors; and Madame Lachapelle maintains the same view; for she says there has always been a prevalent opinion on this point, which I can by no means adopt: that is, the dilatation of the passages is generally supposed to be more difficult in women advanced in years than in others, and there is not an accoucheur who does not dread the first labour in a female of thirty or thirty-five years of age; nor is there a woman in that condition who does not anticipate with terror the hour of her delivery; but my experience has so often proved the fallacy of such prejudices that I cannot adopt them.

No doubt, the accouchement is often slow and painful in middle-

aged women who have had no children ; but is it not the same in the youngest ? and the proportion, I dare affirm, is perfectly equal—that if four primiparae in ten have an easy labour, four in ten of the most aged will be delivered with promptitude and facility.

CHAPTER III.

OF THE MECHANICAL PHENOMENA OF LABOUR.

ARTICLE I.

OF THE PRESENTATIONS AND POSITIONS.

WHEN speaking of the child's attitude in the uterine cavity, we stated that it was generally situated in such a way that the cephalic extremity formed the most dependent part. But it may also happen, under the influence of causes, hereafter to be studied, that one of the other points of the great axis corresponds to the uterine neck; that is to say, the upper or the cephalic extremity, the inferior or the pelvic extremity, or even some part of the middle portion or trunk, may first present itself at the superior strait. Now, it is very evident that such different circumstances of presentation must necessarily influence the mechanism of the labour, as also the facility and the promptness of the child's delivery, and it is therefore highly important to understand well all those diverse situations before commencing the study of the mechanism proper. This study comprises the presentations and positions, as they are called; and in using these terms we wish to designate by the word *presentation* the part that first offers at the superior strait; and by that of *position*, the relations which this presenting part has contracted with the different points of the same strait.

The older accoucheurs only endeavored to recognize the presenting part, without searching after its relations with the various points of the strait's circumference ; but since the days of Solayres, and more especially since those of his pupil Baudelocque, everybody has had a classification of his own; and the number of presentations and positions, considered as so many separate and distinct ones, varied with each author, who wrote on the obstetrical art.

We give, in the following tables, the classification of Baudelocque, and the principal ones of those who have succeeded him :—

GENERAL TABLE OF THE CLASSIFICATIONS.

NAMES OF AUTHORS.	PRESENTATION.	RELATIONS OF THE FETAL PARTS WITH DIVERS POINTS OF THE PELVIS.	DENOMINATION OF THE POSITION.
		Occiput at the left acetabulum	1st. Left occipito-cotyloid.
		Occiput at the right acetabulum	2d. Right do
		Occiput at the symphysis pubis	3d. Occipito-pubic.
		Occiput at the right sacro-iliac symphysis	4th. Right occipito-sacro-iliac.
		Occiput at the left sacro-iliac symphysis	5th. Left occipito-sacro-iliac.
		Occiput at the sacro-vertebral angle	6th. Occipito-sacral.
		Chin at the symphysis pubis	1st. Mento-pubic.
		Chin at the sacro-vertebral angle	2d. Mento-sacral.
		Chin directly to the right	3d. Right mento-iliac.
		Chin directly to the left	4th. Left mento-iliac.
		Heels at the left acetabulum	1st. Left calcaneo-cotyloid.
		Heels at the right acetabulum	2d. Right calcaneo-cotyloid.
		Heels at the symphysis pubis	3d. Calcaneo-pubic.
		Heels at the sacro-vertebral angle	4th. Calcaneo-sacral.
BAUDELOCQUE		Front of the tibias at the left acetabulum	1st. Left tibio-cotyloid.
		do at the right acetabulum	2d. Right tibio-cotyloid.
		do at the symphysis pubis	3d. Tibio-pubic.
		do at the sacro-vertebral angle	4th. Tibio-sacral.
		The sacrum at the left cotyloid cavity	1st. Left sacro-cotyloid.
		The sacrum at the right cotyloid cavity	2d. Right sacro-cotyloid.
BREECH		The sacrum at the symphysis pubis	3d. Sacro-pubic.
		The sacrum at the sacro-vertebral angle	4th. Sacro, or lombo-sacral.

NAMES OF AUTHORS.	PRESERATION.	RELATIONS OF THE FETAL PARTS WITH DIVERS POINTS OF THE PELVIS.	DENOMINATION OF THE POSITION.
BAUDELOCQUE . . .	TRUNK	Occiput Neck Back Loins Face Front of neck Breast Abdomen Front of pelvis do of thighs Side of the head do of neck Shoulder Side of thorax Flank Hip	Four positions for each of these presentations, viz.:— Head above the pubis Head above the sacro-vertebral angle Head to the left Head to the right 1st. Cephalo-pubic. 2d. Cephalo-sacral. 3d. Left cephalo-iliac. 4th. Right cephalo-iliac.
GARDIEN	BREECH	VERTEX FACE FEET KNEES BRECH	Six positions, the same as Baudelocque Four positions, the same as Baudelocque Four positions, the same as Baudelocque
CAPURON	TRUNK	Right side Head to the left Left side Head to the right Anterior plane Head in front Posterior plane Head behind	Four positions for each of these, viz.:— 1st. Left cephalo-iliac. 2d. Right cephalo-iliac. 3d. Cephalo-pubic. 4th. Cephalo-sacral.
	VERTEX	Occiput at the left acetabulum Occiput at the right acetabulum Occiput at the right sacro-iliac symphysis Occiput at the left sacro-iliac symphysis Chin at the left acetabulum Chin at the right acetabulum Chin at the right sacro-iliac symphysis Chin at the left sacro-iliac symphysis	Same denomination as Baudelocque. do do do do do do do do do

NAMES OF AUTHORS.	PRESENTATION.	RELATIONS OF THE FETAL PARTS WITH DIVERS POINTS OF THE PELVIS.	DENOMINATION OF THE POSITION.
FEET	• • •	{ Four positions for each of these three presentations, according as the heel, the anterior tibial surfaces, or the posterior face of the sacrum correspond to the— Left acetabulum Right acetabulum Right sacro-iliac symphysis or, Left sacro-iliac symphysis	First position. Second do Third do Fourth do
KNEES	• • •	{ In each of these four, the head may be found above the— Right side Left side Anterior plane Posterior plane	1st. Left cephalo-cotyloid. 2d. Right cephalo-cotyloid. 3d. Right cephalo-sacro-iliac. 4th. Left cephalo-sacro-iliac.
BREECH	• • •	{ Occiput at the left acetabulum Occiput at the right acetabulum Occiput at the right sacro-iliac symphysis Occiput at the left sacro-iliac symphysis	1st. Left occipito-cotyloid. 2d. Right occipito-cotyloid. 3d. Right occipito-sacro-iliac. 4th. Left occipito-transverse.
CAPURON	• • •	{ Occiput directly to the left Occiput directly to the right Chin directly to the right Chin directly to the left	5th. Left occipito-transverse. 6th. Right occipito-transverse.
TRUNK	• • •	{ Loins to the left Loins to the right Loins in front Loins behind	1st. Right mento-iliac. 2d. Left mento-iliac. 1st. Left lombo-iliac. 2d. Right lombo-iliac.
VERTEX	• • •	{ Head left Head right Head left	3d. Left occipito-sacral. 4th. Lombo-pubic.
FACE	• • •	{ Head left Head right Head left	1st. Left cephalo-iliac. 2d. Right cephalo-iliac.
LACHAPELLE	•	{ Left side Left side Left side	1st. Left cephalo-iliac. 2d. Right cephalo-iliac.
PELVIC EXTREMITY		{ Like Baudelocque Like Lachapelle	Same as Baudelocque. Same as Lachapelle.
KNEES		As many positions for each of these three presentations as for the vertex	The same corresponding denominations for each of the six positions.
BREECH		{ Right side Left side Posterior plane Anterior plane	1st. Left cephalo-iliac. 2d. Right cephalo-iliac.
TRUNK	• • •	{ Head to the left Head to the right Anterior plane	
VELPEAU	• • •		

CLASSIFICATION OF PROFESSOR MOREAU.

TWO CLASSES { NATURAL LABOURS.
ARTIFICIAL LABOURS.

FIRST CLASS.—NATURAL LABOURS.

FIRST ORDER. Presentation of the cephalic extremity.	1st GENUS. Vertex presentation.	1st position.—Left occipito-ilium	{ anterior, transverse, posterior.
		2d position.—Right occipito-ilium	{ anterior, transverse, posterior.
		3d position.—Occipito-pubic.	
		4th position.—Occipito-sacral.	
	2d GENUS. Face presentation.	1st position.—Right mento-ilium	{ anterior, transverse, posterior.
		2d position.—Left mento-ilium	{ anterior, transverse, posterior.
		3d position.—Lobulo-pubic.	
		2d position.—Left lobulo-ilium.	
	3d GENUS. Presentation of the sides of the head. 2 sub-divisions. Right side.	3d position.—Right lobulo-ilium.	
		1st position.—Left sacro-ilium	{ anterior, transverse, posterior.
		2d position.—Right sacro-ilium	{ anterior, transverse, posterior.
		3d position.—Sacro-pubic.	
SECOND ORDER. Presentation of the pelvic extremity.	1st GENUS. Breech presentation.	4th position.—Sacro-sacral.	
		1st position.—Left calcaneo-ilium.	
		2d position.—Right calcaneo-ilium.	
		3d position.—Calcaneo-pubic.	
THIRD ORDER.	2d GENUS. Foot presentation.	4th position.—Calcaneo-sacral.	
		1st position.—Left tibio-ilium.	
		2d position.—Right tibio-ilium.	
		3d position.—Tibio-pubic.	
THIRD ORDER.	{ Accidental natural labour.	4th position.—Tibio-sacral.	
		Single genus.—Presentation of the trunk. (<i>Vide infra.</i>)	

SECOND CLASS.—ARTIFICIAL LABOURS.

FIRST ORDER. Accidental artificial labour.	1st GENUS. Accidents on the mother's part.	1st position.—Left cephalo-ilium.	
		2d position.—Right cephalo-ilium.	
	2d GENUS. Accidents on the part of the fetus.	1st position.—Left cephalo-ilium.	
		2d position.—Right cephalo-ilium.	
	SINGLE GENUS. Presentation of the trunk. 2 sub-divisions.	1st position.—Left cephalo-ilium.	
		2d position.—Right cephalo-ilium.	
		1st position.—Left cephalo-ilium.	
		2d position.—Right cephalo-ilium.	
SECOND ORDER. Essentially artificial labour.	1st GENUS. On the part of the child.	1st position.—Left cephalo-ilium.	
		2d position.—Right cephalo-ilium.	
	2d GENUS. On the part of the mother.	1st position.—Left cephalo-ilium.	
		2d position.—Right cephalo-ilium.	
THIRD ORDER. Labours, which are the result of mal- formation.	APPENDIX, OR THIRD CLASS.—ANOMALIES.		
	Anomalies either in the seat, course, or products of gestation, or lesions in the organs of generation.		

The reader will see, by the foregoing table, that Baudelocque primarily divides the foetus into two extremities; the one represented by the apex of the head, the other by the feet, knees, or breech; and further, that the remainder of the child's surface is divided off into four regions, which are again subdivided into several others. Then, after having determined the foetal regions, the presence of which, at the superior strait, constituted a presentation, it was equally necessary to understand the positions. For that purpose certain points of departure were selected, both on the pelvis and on the presenting part of the child. Of course, these points varied according to the presentation; thus, in a vertex one, Baudelocque took the occiput and forehead as the points on the foetal head; he then divided the basin into an anterior and a posterior moiety; on the first of which the right and the left eotyloid cavities and the symphysis pubis, and on the second the right and left sacro-iliac symphyses, and the sacro-vertebral angle were selected as the points of departure; he next established six positions of the vertex, in each of which the occiput corresponded to one of those points on the pelvis just indicated.

In the presentations of the breech, knees, and feet, he retained the same three points on the pelvis' anterior half, but on the posterior moiety he only adopted one; the sacro-vertebral angle. On the foetus, the heels were the points of correspondence in foot presentations, the sacrum for the breech, and the front surface of the legs for those of the knee. Consequently, but four positions were admitted for either the breech, feet, or knees.

Lastly, for the presentations of the numerous regions indicated by the table on the anterior, posterior, and lateral planes of the foetus, he selected on the mother's pelvis the two extremities of the antero-posterior diameter (the symphysis pubis and the sacro-vertebral angle), and the two ends of the transverse diameter, as the points of departure, so that he pointed out four possible relations, that is to say, four positions for each one of these presentations. Thus, Baudelocque admitted altogether one hundred and two distinct positions. But it was soon ascertained that this very considerable number was wholly useless in practice; and besides, it had the serious disadvantage of disgusting pupils with the study of midwifery. The classification of Baudelocque was therefore modified to some extent, and we have successively traced, in our table, the principal of those modifications; though even after adopting these latter, the obstetrical art was still too much overburdened, and it remained for M. Nægèle to simplify this branch of medical science, much more than it had ever been done before his day. To him, therefore, we must attribute this honor, as also to Dubois, and Stoltz of Strasbourg, who first endeavored to disseminate throughout France the views of the Heidelberg professor! But it must be acknowledged, however, that the labors of Madame Lachapelle, and the teachings of Ant. Dubois, have not been altogether fruitless in producing this amelioration.

We should also observe that the classification of M. Moreau is far more simple than all those of Baudelocque and his followers; indeed, this professor has adopted (as seen by the table) most of the ideas upon which the arrangement of Nægèle is founded, and we only regret that he has considered the presentations of the sides of the head and certain of the positions as distinct, which we hope to demonstrate hereafter do not merit such a distinction.

In fact, there is no region of the child which may not present at the superior strait during the labour, and therefore, if we are to consider all the points of its surface that may be accessible to the finger as so many distinct presentations, their number would be very considerable; but if, on the contrary, the expression is only applied to the presence of a region large enough to occupy the whole superior strait, more especially to one requiring a notable difference either in the mechanism of its spontaneous expulsion, or in the manœuvres to be resorted to, this number would then be much more limited.

Upon such opinions, advocated long since by Madame Lachapelle and Ant. Dubois, M. Nægèle has founded the following classification, which is now admitted and taught by Dubois and Stoltz in France, namely: three principal regions are distinguished in the fœtus; 1. The head, or cephalic extremity; 2. The pelvis, or pelvic extremity; and 3. The trunk; either of which parts may offer first at the superior strait.

When the cephalic extremity presents, it is ordinarily flexed on the chest, and the vertex then advances first; but it may also be extended or thrown backwards on the posterior plane, in which case the face engages first. We have therefore to distinguish between a vertex presentation and one of the face, for the mechanism of labour is very different in the two. When the pelvic extremity presents, the legs are usually flexed on the thighs, and the latter on the abdomen; but it may happen, from a variety of causes that we shall hereafter designate, that these divers parts, which are usually folded up in this manner, are separated from each other: thus, they sometimes engage altogether in the excavation; at others, either during the course of the labour itself, or some time before, the inferior members stretch out and lay along the front of the body, and the nates then descend alone. Again, the legs are swept down either by the gush of the waters, or by some other cause, and engage first; hence, in this latter instance, if the deflexion of the lower members is complete, the feet are the first to clear the vulva; but if, on the contrary, the thighs be extended, and the legs remain flexed on them, the knees will be the first to show themselves at the external orifice.

Now it must be evident, on the least reflection, that those latter circumstances can effect no modification in the mechanism of the labour itself, and accoucheurs are certainly in error in considering them as so many distinct presentations; consequently, we shall describe them under the single title of the presentation of the pelvic extremity; merely remarking that, when this extremity presents, all its constituent elements may happen to engage together at

the same time, or they may be separated, and then the breech, or the knees, or feet, will offer first at the vulva.

But before proceeding any further, we will follow the example of M. Dubois (from whom this article is borrowed almost verbatim), by laying down precisely the limits of the fetal regions embraced in the double expressions of the cephalic and the pelvic extremity: thus, when the head or the pelvis presents at the superior strait, it usually does so nearly "plumb;" that is to say, the long diameter of the foetus is almost parallel to the axis of this strait; so that the sagittal suture in the vertex presentations, the facial median line in those of the face, and the fissure between the nates in those of the pelvic extremity, occupy very nearly the centre of the abdominal strait.

But very numerous exceptions to this rule occur, because the foetus' mobility in the uterine cavity, and the frequency of uterine obliquities may cause the child's long diameter to be inclined forwards, backwards, or towards the sides. Then, as the reader will observe, the presenting part, participating in this inclination, will not be so regularly placed as usual: thus, if it were a vertex presentation, and the inclination were anterior, the summit would no doubt descend, though it would be accompanied by the forehead in consequence of this defective position; or, if the inclination were on the posterior plane instead of the forehead, we should have the occiput or occasionally even the neck. Again, if it is lateral, that is, if the foetus is bent towards one side, the vertex and one side of the head may be recognized at the same time; and the sagittal suture, instead of corresponding to the axis of the superior strait, will then be found either behind or in front, according to the direction of the inclination; but such inclinations do not deprive the vertex presentation of its character, they only convert it into a defective and an irregular presentation.

The observations just made in regard to vertex presentations, equally apply to those of the face and breech, and we may therefore have regular and irregular ones of these parts just in the same way. To resume, we shall include in the class of vertex presentations, all those designated by Baudelocque under the names of presentations of the occiput, nape, and lateral parts of the head; in face presentations, those of the forehead, chin, cheeks, front and sides of the neck; and in the breech, those of the sacrum, genital parts, front of thighs, etc.; whence all the surface comprised between the sinciput and the shoulders belongs to the cephalic presentations, and that between the summit of the nates and the haunches is referred to the pelvic ones.

If we now take off all the foetal parts included in the cephalic and pelvic extremities, there will only remain the trunk proper; that is, the portion extending from the shoulders to the hips, and this part may also present the first. Now with regard to this, Madame Lachapelle has long since remarked that, when the trunk offers at the superior strait, it always does so by one of its sides; that is to say, the anterior or the posterior median line of the body never cor-

responds to the axis of the superior strait. And, therefore, she divided the trunk into two lateral halves, either of which may come down first; hence there are two trunk presentations, one of the right lateral plane, the other of the left lateral plane; the whole anterior and posterior right moieties being included in the first, and the same parts on the left being embraced in the second; and as the shoulder, which is then the most prominent part, is nearly always found at the centre of the superior strait, when the lateral planes offer first, that skilful midwife designated them as *presentations of the shoulder*. M. Dubois, however, still retains the name of the *presentations of the lateral region*; and these, like the others, may either be regular or irregular. They are regular when the lateral line is directly at the abdominal strait, but irregular where the anterior or the posterior region of the trunk occupies this strait in a great measure, owing to the child's being more or less inclined forward or backward; and it is to such irregularities that we must refer all those presentations of the back, loins, front of the chest and abdomen described by the older authors.

On the whole, then, we admit five presentations, viz.: one of the vertex, one of the face, one for the pelvic extremity, one for the right lateral plane, and one of the left lateral plane. Besides the presentations, Baudelocque, and all those who followed him, described a great number of *positions*; in each of which, according to their account, the mechanism of the labour was different. But M. Nægèle, in consequence of a better conducted study of this mechanism, has succeeded in changing entirely this branch of the science, and has further proposed a reform in the positions, at least as important as what he has already made in the classification of the presentations. Thus, he simply divides the pelvis into two lateral halves, the right and the left, and these form the only points of departure at the superior strait; on the fœtus, the points admitted by Baudelocque are retained. For instance, in a vertex presentation, the occiput may offer at any one point whatever of the left lateral half of the superior strait, thereby constituting the first position of the vertex; or it may correspond in a similar way with the right lateral half, thus producing the second position; further, as the mechanism is just the same, whether the occiput be at first at the front, in the middle, or behind, we shall only consider these circumstances as so many varieties of the same position; which shades or varieties, in the great majority of cases, do not change the mechanism of the natural labour in anywise, and therefore do not deserve to be received as important elements in a classification; but of which, however, more account should be taken than appears to have been done by M. Nægèle, for they may be usefully recalled in explanation of certain anomalies, as also for our successful intervention in some cases of difficult labour.

What has just been stated concerning the vertex equally applies to the positions of the face and breech, since in the former the chin may be directed towards some point, either on the right or the left lateral moiety of the pelvis; and in the latter the sacrum may have

a similar relation with some point of its right or left half; therefore, we adopt a first, or the *right mento-iliac*, and a second, or the *left mento-iliac* position for the face; and likewise for the breech, we have a first, or the *left sacro-lateral*, and a second, or the *right sacro-lateral* position. Lastly, the two presentations of the trunk have each two positions; for example, the right side of the foetus presenting, the head may happen to be placed either above some point on the left lateral moiety, or over a similar part on the right one. Hence, there are two positions; first, the *left cephalo-iliac*, and second, the *right cephalo-iliac*; or, if the child's left side presents in the same way, the head may be either to the left or the right, thus giving rise to two new positions, the *left* and the *right cephalo-iliac* position.

There is scarcely a necessity for adding that the *anterior*, *transverse*, and *posterior* varieties admitted for vertex positions, are also retained for the two fundamental ones of the face, the breech, and the right and left sides.

SUMMARY.

1. Vertex presentation . . .	{	Left occipito-iliac	3 varieties	{	anterior,
		Right occipito-iliac	3 varieties		transverse,
2. Presentation of the face . .	{	Right mento-iliac	3 varieties	{	posterior.
		Left mento-iliac	3 varieties		anterior,
3. Presentation of the breech	{	Left sacro-iliac	3 varieties	{	transverse,
		Right sacro-iliac	3 varieties		posterior.
4. Presentation of the right lateral plane	{	Left cephalo-iliac	{	anterior,	
		Right cephalo-iliac		transverse,	
5. Presentation of the left lateral plane	{	Left cephalo-iliac	{	posterior.	
		Right cephalo-iliac		anterior,	
				{	posterior.
				{	The same varieties may
					present; that is, the head
					may either be in front, in
					the middle, or behind; but
					here they are much less
					important than in the pre-
					ceding presentations.

But all the presentations and positions just indicated have not the same frequency, nor are they all equally favorable to the spontaneous expulsion of the child. There are some even, such as the positions of the trunk, in which this is most generally impossible, but there is no one, however, in which it absolutely cannot take place; therefore, we shall have to examine the mechanism of natural labour in each of these presentations successively, reserving to ourselves the privilege of reverting in the fourth part of this work to those which usually offer an insurmountable difficulty; and as the vertex presentations are the most frequent and favorable of all, we shall commence with a description of them.

ARTICLE II.

OF THE VERTEX PRESENTATION.

This presentation is far more frequent than all the others put together; thus in 20,517 births reported by Madame Boivin, 19,810 children were born by the vertex; and in 2020 cases reported by M. Dubois, there were 1913 of this variety. Again, when the vertex presents, the occiput is much oftener directed towards the left than the right side; for instance, in the 1913 cases just cited, M. Dubois noticed 1367 left occipito-iliac, and only 546 right occipito-iliac positions. Nor are the three varieties pointed out for each position equally frequent; thus, in the 1367 cases where the occiput was directed to the left side, it was inclined forwards, that is, towards the left cotoyloid cavity 1355 times, and only 12 times backwards, in the direction of the left sacro-iliac symphysis, or nearly so. But in the 546 instances of right occipito-lateral positions an opposite result was observed; for the occiput was only found 55 times at the right acetabulum, but 491 times at the right sacro-iliac symphysis; so that, contrary to the generally received opinion, the posterior right occipito-iliac position is much more frequent than the anterior one. We have given these results as ascertained by M. Dubois himself, because they are entirely consonant with our own observations, and with those of M. Stoltz of Strasbourg.

In one hundred cases of vertex presentations, it has been found on an average, says M. Nægèle, that in seventy the occiput is directed in front and to the left, and behind and to the right in thirty; he considers the other varieties as being very rare and altogether exceptional.

In these results, no question seems to be made of the varieties we have designated as the transverse ones, and it is highly probable that they have been approximatively added to one of the four preceding groups, for these positions are not very unusual; indeed, I have often met with them myself at *la Clinique*.

"These positions," says Madame Lachapelle, "are more frequent than those where the occiput corresponds to the left sacro-iliac symphysis," and, I will add, than those where it is at the right acetabulum; and, furthermore, that the left transverse occipito-iliac position is more common than the opposite one.

§ 1. CAUSES.

As we have already spoken of the cause of the vertex presentations, when treating upon the child's attitude in the uterine cavity, we shall not now go over the same ground, but will only remark, that most accoucheurs attribute the frequency of the head's dependent position to its own specific weight; whilst M. Dubois, after having endeavored to refute the general opinion, has considered this position as the consequence of an instinctive determination of the foetus

itself. (*Vide art. Fœtus.*) However, it is not at all difficult to explain why the left anterior, and the right posterior occipito-iliac varieties are the most frequent of any, since it is evidently owing to the presence of the rectum on the left side; in fact, being habitually distended by faecal matters, this gut forces the forehead or the occiput, when either of these parts look backwards, and to the left, to pass towards the front. But it is far more difficult to say why the occiput is so much more frequently found in front than behind, although this very probably depends on the same causes as those which determine the vertex presentation.

Thus, the head's posterior half weighs far more than the anterior, and the same is true of the trunk; further, when the woman is standing, sitting, or on her knees, or even lying on the side, the anterior abdominal wall is the most dependent portion, towards which the child's heaviest parts, that is to say, its posterior plane, must necessarily tend.

§ 2. DIAGNOSIS.

Before the accouchement, and even during the last few months of gestation, the vertex can often be recognized as presenting; while in every other presentation the part that offers first, from being irregular, voluminous, and badly adapted to the form of the inferior uterine segment, and of the superior strait, is always so high up, and is separated from the uterine wall by so large a quantity of waters, that it is scarcely accessible to the finger.

The summit, on the contrary, offering a rounded, spheroidal surface repose, almost without the intervention of any liquid, on the uterine walls, nay, even presses them before it, and engages in the excavation, descending in some cases as low down as the floor of the pelvis. Hence, whenever the vertex presents, it is easily detected through the inferior portion of the uterine substance, unless, indeed, it should be retained at the superior strait by a considerable inclination of, or by a vice of conformation in, the pelvis.

In a word (and this reflection appears to me essentially practical), whenever the accoucheur does not easily reach the presenting part in the last few days of the gestation, and more particularly during the first periods of labour, he should examine the woman very carefully; for it is then exceedingly probable that the head is not at the superior strait; or, even where the cephalic extremity does present flexed, there is reason to fear a wrong direction, or perhaps a vicious organization of the head or pelvis; all which circumstances may subsequently require the intervention of our art.*

* A variety of circumstances may occur towards the end of gestation, or at the beginning of the labour dependent on causes wholly foreign to any vicious positions, whereby it might happen that no part could be detected by the touch: thus, it is sometimes observed in women who have had several children, and in whom the fundus uteri is strongly inclined forwards; 2. In cases of twins; 3. In breech presentations; 4. Where a considerable quantity of the waters exists; 5. Where the uterus is not oval at its inferior part. 6. When the head is hydrocephalous; and lastly, where the pelvis is narrow. (*Négèle*, translated by *Pigné*.)

Auscultation is a resource of great value in establishing the diagnosis; in fact, the reader may remember that, in vertex presentations, the pulsations of the foetal heart are heard in one of the iliac fossæ, the left when the occiput is turned to the left, and the right in the opposite case. Again, let it be borne in mind, that the active foetal movements felt by the mother at the same part of the abdomen for a long time, indicate the correspondence of this point with the child's anterior region.

Supposing the labour has begun, if the finger be introduced through the cervix uteri, it will immediately encounter a rounded, smooth, and resistant surface, which is the anterior side of the head; and then, by directing the index a little further upwards and backwards, in the direction of the sacro-vertebral angle, it will come into contact with a membranous interval, that is, with the sagittal suture.

A vertex presentation is now ascertained; and the next step is to make out the position. For that purpose we first assure ourselves of the suture's direction, and if it prove to be oblique, running from before backwards, and from the left towards the right, the position must either be the left anterior, or the right posterior-occipito-iliac one; but, on the contrary, if it be oblique in the other diameter, the position will either be the right anterior or the left posterior-occipito-iliac, &c.

The direction being once determined, we have then only to find out where the occiput lies, to complete the diagnosis; therefore, the finger, by raising up the margin of the os uteri, follows the sagittal suture until it reaches a fontanelle, which is to be distinguished by the characters hitherto described. (Vide *Head of the Fœtus at term.*)

§ 3. MECHANISM.

The mechanism by which the child's expulsion is accomplished in positions of the summit is very nearly the same in all cases where the occiput corresponds with one of the points of the left lateral moiety; but it differs in some respects from that observed in the positions designated as the right-occipito-iliac ones.

We must, therefore, examine it in both of these divisions; and as, among the admitted varieties, there are two (the anterior in the left occipito-iliac, and the posterior in the right occipito-iliac), which are almost constantly met with, we shall take them up successively as the types of our description.

1. Mechanism of Natural Labour in the left Anterior Occipito-iliac position. (The first, or the left occipitoclyoid position of authors.)—In this position, the occiput corresponds to the left ileo-pectineal eminence, the forehead to the right sacro-iliac symphysis, and the sagittal suture lies in the direction of the left oblique diameter of

Fig. 53.



Representing the head in the left anterior occipito-iliac position.

the pelvis. (In order to avoid unnecessary repetitions and delays, we premise, once for all, that we shall designate that oblique diameter which runs from the left towards the right side and from before backwards, as the *left oblique*, and the one passing from the right towards the left, and from in front posteriorly, as the *right oblique diameter*.) The posterior fontanelle is found to the left and in front, the anterior one is behind and to the right. The dorsal plane of the foetus looks forwards and towards the left side; while its anterior plane is directed backwards and to the right; the right shoulder is in front and to the right side; the left one is behind and towards the mother's left.

Before the bag of waters is ruptured, the child's head is slightly flexed on the front of the chest, and the following are the relations of its diameters with those of the superior strait: the occipito-frontal corresponds to the left oblique of the strait, and the bi-parietal to the right oblique;* and, of course, the head's occipito-frontal circumference is parallel with the periphery of the abdominal strait, and the axis of this strait runs along the trachelo-bregmatic diameter† of the head.

When the membranes are ruptured, a variable quantity of liquid escapes; then the uterus contracts and applies itself more directly to the foetal trunk: nevertheless, as but little fluid passes away in vertex positions at this time, there usually remains a sufficient quantity of it to render the pressure of the uterine walls on the child far from being immediate.

After the rupture, the object of the contractions is to expel it

* We may remark, however, with M. Dubois, that this last relation is not positively exact. For instance, if the head of a foetus at term be found at the superior strait, so that the occipito-frontal diameter is parallel with the left oblique, the shape of the head will prevent the bi-parietal one from corresponding with the right oblique diameter. In fact, in this position, the posterior extremity of the bi-parietal diameter is at the left sacro-iliac symphysis, but the anterior extremity, instead of terminating opposite the ilio-pectineal eminence, is found very near the middle of the horizontal branch of the pubis.

† M. Nægèle and Professor Dubois (who adopts, at least in part, the views of the Heidelberg Professor), do not believe that the head presents at the superior strait, in the majority of cases so regularly in all its relations, as we have just described, for they say the head does not offer perpendicularly to the plane of the strait, but, on the contrary, in an oblique direction; whence the right parietal protuberance, which is also the anterior one, would be lower, relatively to the plane than the left; and the bi-parietal suture, instead of being found in the direction of the strait's axis, would be a little behind it, according to M. Dubois, and would even look towards the second bone of the sacrum, agreeably to M. Nægèle.

But, notwithstanding these imposing authorities, we believe the occipito-frontal circumference is closely parallel to the plane of the strait in most cases, although the parietal boss is certainly one of the head's most dependent parts, and the finger first strikes upon it in practicing the vaginal examination. But those facts by which Nægèle sustains his views, prove just the contrary; because the plane of the abdominal strait, being directed very obliquely downwards and forwards, the portion of the head in contact with the anterior arch of the pelvis should be its most dependent part; and further, the finger first encounters the anterior parietal protuberance, because the introduction takes place under the symphysis pubis, and therefore the index can only reach the anterior portion of the head, whose greatest circumference is parallel to the plane of the superior strait, in a very oblique manner.

from the womb; whereby the foetus becomes flexed anteriorly, and its superior and inferior extremities are more closely folded up; and, from that moment, properly speaking, the mechanical phenomena of labour begin.

These phenomena, or stages of the mechanism, are five in number, as follows: in the first, the head is more strongly flexed on the chest; in the second, it traverses all the space between the superior and the inferior straits, and reaches the floor of the pelvis; there it experiences a movement of rotation which carries the occiput behind the symphysis pubis, thus constituting the third period; in the fourth, the head undergoes the process of extension, by which all the superior and anterior parts of the vertex and face become completely disengaged at the anterior commissure of the perineum; and then, after its perfect expulsion, the child's cephalic extremity performs a fifth and last movement, designated by Baudelocque as the period of restitution, but which M. Gerdy has proposed to name the *exterior rotation*.

A. *Stage of Flexion.*—After the rupture of the membranes, the foetal trunk, being compressed on all sides, transmits to the head, through the spine, the impulse derived from the uterine contractions; and, therefore, the summit, being forcibly pressed on, has a tendency to clear the uterine orifice, and to engage in the excavation. But it then encounters resistances, either from the os uteri, which is not yet sufficiently dilated, or from the superior strait, or the walls of the excavation; and being thus placed between a power and a resistance, the head must naturally become still more flexed on the chest; in fact, the force of expulsion transmitted by the vertebral column, falling upon the occipital foramen, that is, on a point much nearer to the occiput than the chin, must necessarily (the resistance being equal at the two extremities of the occipito-mental diameter) act more powerfully on the occiput than on the chin, in other words, must press down the occiput into the excavation. But, by depressing this part, the chin is forced to ascend, thus producing the flexion of the head.*

Fig. 54.



The head in the same position, though more flexed.

* In order to prove that the movement of flexion results from the position of the occipital foramen, relatively to the chin and occiput, which represent the two extremities of the lever whereon the spine is articulated, let us suppose, for a moment, that the vertebral column is attached to the occiput alone, when it is evident that the latter only will descend; on the other hand, let it be made to the chin, which will then descend the first, and lastly let it be done at the centre of the interval between these two extremes, and an equilibrium will be produced, the same as results from equal weights or resistances placed in the dishes of a balance having equal arms. But where the articulation takes place nearer one extremity than the other, the descent will occur at this extremity, just as it would happen in the above-cited balance, if, without altering anything else, the arms were rendered unequal in their length.

To conclude, lest the foregoing should not satisfactorily explain the pheno-

The head being in this way forcibly flexed, its relations are changed; that is, the occipito-bregmatic diameter has taken the place of the occipito-frontal, and has become parallel to the left oblique of the strait; but the bi-parietal remains unaltered: the occipito-bregmatic circumference is now on a level with the periphery of the strait, and the axis of the pelvis, which before corresponded with the trachelo-bregmatic diameter, now traverses the head very nearly in the direction of the occipito-mental diameter.

This movement of flexion, therefore, evidently places the child's head in the most favorable position for its passage, by constraining it to offer its smallest diameters to those of the pelvis.

b. *Stage of Descent.*—The head, pressed on by the contractions, enters the excavation and reaches the floor of the pelvis. In making this descent, the occiput presses in front against the internal and anterior face of the body of the ischium, the obturator internus muscle and the external obturator vessels and nerves, which pass out through the upper part of the obturator foramen; while the forehead or bregma presses behind on the internal border of the psoas and pyramidal muscles, the sciatic plexus of nerves, together with the gluteal and the internal pudic vessels and nerves. The left side of the head likewise comes into immediate relation with the same parts, and also glides over the anterior surface of the rectum. But the head's descent is not completed until the occipito-bregmatic circumference is nearly parallel to the plane of the inferior strait, that is, when the two parietal protuberances have attained this level. Now it is evident that, to reach this point, the left parietal boss (which is found behind) must traverse the whole anterior face of the sacrum, whilst the anterior one has only to clear a much shorter space; the first must therefore describe the arc of a much larger circle than the second. Perhaps a more exact idea of the head's actual movement will be formed by imagining the anterior extremity of the bi-parietal diameter to remain nearly stationary in front and to the right, while its posterior extremity descends rapidly and traverses the whole posterior plane of the excavation.

c. *Stage of Rotation.*—The head being arrested by the floor of the pelvis, executes a movement of rotation, during which the occiput passes from left to right behind the symphysis pubis, or rather behind the left ischio-pubic ramus, and the bregma rotates into the concavity of the sacrum, though remaining a little towards the right.

menon, I propose the following rationale: the head, urged on by the uterine contraction, communicated to it by the spine, meets with resistance from the os uteri, which is not yet sufficiently dilated. Let us change, for an instant, the order of forces, making the vertebral articulation a *point d'appui*, and the opposition on the part of the neck the power; now, this power is evidently equal in all points of the neck's periphery; but let us observe that, as the interval between the chin and the occipital foramen is greater than that betwixt the latter and the occiput, the resistance against the chin operates on a longer lever than that against the occiput, and consequently the first must be the more powerful of the two, and therefore it forces the chin to ascend. But raising the latter has the same effect as depressing the occiput; that is, still producing a flexion of the head.

The posterior-superior part of the right parietal boss then appears plainly under the pubic arch; the posterior fontanelle is behind the ischio-pubic ramus; and the sagittal suture crosses the coccy-pubal diameter very obliquely. Being forced on by the energetic contractions of the womb, the vertex then depresses the soft perineal walls, and by gradually distending them, succeeds in converting the pelvic floor into a part of a canal which prolongs the posterior wall of the basin downwards and backwards. It is during this time that the rotation is accomplished—that is, the sagittal suture becomes parallel with the antero-posterior diameter of the inferior strait. The occiput engages in the arch of the pubis, and continues to pass the lower part of the symphysis, until the back part of the neck comes into contact with this latter, when the head's anterior progression is arrested.

D. Stage of Extension.—Just at the moment when the occiput engages in this manner in the pubic arch, the shoulders and upper part of the body enter the excavation, and in engaging there, the foetal trunk, which is flexible, accommodates itself to the direction of the canal, and consequently turns over a little on its posterior plane; this movement causes the chin to depart from the chest, and then the extension of the head begins.

But, in order to understand how this last is completed, we must remember that the force of the uterine contraction, transmitted always by the spine, falls upon some part of the occipito-mental diameter, and that, in the beginning of the labour, this power operated both on the occiput and the chin, though up to the present moment the occiput had felt its influence the most; 1st, because, from the forced flexion of the head, it was more in the line of its direction; and, 2d, from the fact of its falling on the occipital foramen, the impulse was much nearer to the occiput than the chin; but the occiput having once engaged under the pubic arch, and the back of the neck being applied to the symphysis pubis, which, by its resistance, destroys all that portion of the uterine force that acted on the occiput, there only remains the power operating on the chin. Now this power is maintained, and under its influence the chin is pushed down, and consequently, by a continuance of the same movement, the occiput ascends—that is to say, the whole head is turned up in front of the symphysis pubis (the lower part of the latter acting as a pivot upon which the neck rests, and the head turns).

During this extension, the following points successively appear at the anterior commissure of the perineum; viz., the bi-parietal suture, the bregma (or fontanelle), the coronal suture, the nose,

Fig. 55.



The head is seen in various degrees of extension, the nape of the neck resting first behind, and then under the symphysis pubis.

mouth, and last of all, the chin. Pending this process, the head exactly represents a lever of the third kind, whose fulcrum is at the nape of the neck, lying behind and under the symphysis pubis, the power at the occipital foramen, and the resistance at the chin, which is to be depressed, an opposition necessarily augmented by the resistance of the perineum. Further, the occipito-bregmatic, the occipito-frontal, and the occipito-mental diameters successively pass the antero-posterior diameter of the inferior strait. But, as soon as the occipito-bregmatic circumference is beyond the vulva, the anterior border of the perineum, yielding to its natural elasticity, retracts strongly—slips over the face, and embraces the neck; and just at that moment, the head, which was before forcibly turned up in front of the mons veneris, falls back from its own specific weight, towards the anus.

E. *Stage of Exterior Rotation.* (Restitution.)—The head remains for a few seconds in this position, and then it is seen to describe a fifth and last movement, namely—the occiput inclines towards the internal surface of the left thigh, and the face turns towards the right thigh. This process is usually denominated the *restitution*, for the following reason; before the researches of M. Gerdy, it was generally supposed that when the head executed its movement of rotation within the pelvis, the trunk did not participate therein, and that the operation could only take place through the aid of a certain degree of torsion in the neck; and, further, that the head becoming completely disengaged, and only retained by the resistance of the soft parts, the neck then untwisted, and the head became *restituted* in its natural relations with the trunk.

M. Gerdy was the first to demonstrate the faultiness of this explanation; for, in fact, the trunk does participate in the head's rotation, in such a way that the shoulders, which, in the beginning of the labour corresponded to the right oblique diameter, are nearly transverse after this movement (the right shoulder, nevertheless, remaining always a little more in front than the left). The shoulders then reach the inferior strait in a transverse position, presenting, therefore, their great, or bis-acromial diameter, to the smallest one of this strait; but here they encounter some resistance, under the influence of which the rotation is effected in the opposite direction to that of the head, the right shoulder, passing from the right side towards the left, approaches the apex of the pubic arch, while the left one gets into the perineal concavity, and the head, being free externally, necessarily follows the impulse impressed on the shoulders.

The rotation of the head is not therefore an isolated movement peculiar to itself, as Baudelocque supposed, but one secondary to the rotation of the shoulders.

I must remark, however, that, in some cases, the head has appeared to me to execute a double movement; for, immediately after its expulsion, it turns very slightly; the occiput passing a little to the left, the forehead towards the right; after remaining some seconds in this position, it then undergoes the secondary movement just de-

scribed, which is due to the rotation of the shoulders ; but the first has always seemed to result from the neck's untwisting.

The shoulders present at the inferior strait soon after the head, and, as we have just stated, nearly always in a transverse position. The right one gets under the right ischio-pubic ramus, while the left one lies in front of the right (left ?) sacro-sciatic ligament ; whence the bis-acromial diameter is rarely found in the direction of the antero-posterior diameter of the inferior strait. The anterior or sub-pubic shoulder is the first to appear in the vulvar fissure, although, as a general rule, the posterior one, after having traversed the perineal curve, is first disengaged at the anterior commissure of the perineum, and then the right one is subsequently delivered.*

During the disengagement of the shoulders, the foetus becomes flexed on its right lateral region so as to accommodate itself to the curvature in the pelvic canal ; and very soon after the remainder of the trunk is expelled, sometimes describing a very prolonged spiral course in its passage.

2. *Mechanism of Natural Labour in the right posterior occipito-iliac position.* (The fourth of Baudelocque, and the third of M. Capuron.)

In the vast majority of cases, the mechanism of labour in this position scarcely differs from that just described, and therefore we only need allude here to the principal peculiar phenomena of the travail, without repeating all the preceding details.

It, likewise, is composed of five periods, or stages ; before the membranes are ruptured, the head's diameters correspond with the same diameters of the pelvis as in the foregoing case, and the only difference to be remarked is, that the occiput corresponds to the right sacro-iliac symphysis, and the forehead to the left ileo-pectineal eminence. The child's posterior plane looks backwards and towards the mother's right, while its anterior plane is in front and to her left—its left side is placed in front and on the right, its right side behind and to the mother's left.

A. *Period of Flexion.*—The head is flexed by the same forces as in the preceding case, and this flexion determines similar changes in the relations of its diameters with those of the pelvis.

B. *Period of Descent.*—This stage also presents nothing worthy of particular notice.

* Contrary to the generally received opinion, M. P. Dubois supposes that the anterior shoulder is the first delivered. That is certainly true in a great number of cases, but we have most usually observed the opposite fact ; besides, there is a theoretical view which militates in favor of our opinion, that is, the left shoulder, being placed in contact with the posterior plane of the excavation, is situated, much more than the anterior one, in the direction of the uterine axis, or the axis of the superior strait, and therefore must be subjected to a more energetic uterine impulse, and consequently must be delivered first ; further, it was necessary this should be so, as the posterior shoulder has much the longer course to traverse. Again, if I might refer to my own observations, I would say that in women who have before borne children, more especially in those whose perineums have been torn in former labours, the posterior shoulder is the first delivered ; and, on the contrary, in primiparæ, the sub-pubic one has the precedence, the other being retained by the resistance from the soft parts.

c. *Period of Rotation.*—The head having reached the floor of the pelvis, undergoes a movement of rotation, in consequence of which the occiput traverses the whole right lateral moiety from behind forwards, in such a way that it passes successively towards the right extremity of the transverse diameter, behind the cotyloid cavity and under the right ischio-pubic ramus, while the forehead, or bregma, revolving in an inverse direction, goes from before backwards towards the hollow of the sacrum; and thus, the position which was originally occipito-posterior, becomes converted into an occipito-pubic, or anterior one, and the accouchement then terminates just the same as it does in those cases where the occiput was primitively in front.

In some instances (which are rare, however), this conversion does

Fig. 56.



Disengagement of the head in the occipito-posterior positions.

not take place, and the occiput remains behind until the termination of the labour. The accouchement is then concluded in the following manner: the head is strongly flexed on the chest, and retains its oblique position; the forehead, corresponding to the body of the left pubis, first reaches the inferior strait, and the left coronal boss then engages under the pubic arch, where we can sometimes distinguish the superciliary ridge just below the symphysis; and I have even seen the upper eyelid in one case. But though the forehead first appears at the exterior, the occiput, urged on by the spine, which transmits the force of the uterine contraction, traverses the whole

curvature of the perineum (which is greatly distended in such instances), and becomes disengaged the first at the anterior commissure; for, while the occiput is thus passing over the anterior surface of the sacrum and perineum, the coronal boss and eyebrow, that originally appeared at the vulva, reascend and become concealed behind the symphysis.

The occiput is scarcely clear, when the perineum, by gliding over the inclined plane formed by the nape of the neck, retracts strongly and thus facilitates the subsequent delivery of the head's anterior portions; for instance, the head may be observed to undergo the process of extension around the nape as a centre, and to appear below the symphysis in the following order, namely; the anterior fontanelle, the coronal suture, the forehead, nose, mouth, and chin.

Lastly, the head, placed in the right posterior occipito-iliac position, may, when once down in the excavation, depart from the chest, and the vertex presentation be thus spontaneously converted into one of the face, at the inferior strait; indeed, we witnessed a case of this kind at *la Clinique* in 1838.

This transmutation takes place, says M. Guillemot, in the following manner: the occiput being arrested by some point on the posterior part of the excavation, instead of advancing along the perineum towards the inferior strait, ascends in the curvature of the sacrum

by executing the movement of rotation backwards, and turning on the chest. During this time, the forehead and face descend behind the pubis and go downwards and backwards, until the chin engages under the arch, and then the head, which is completely turned back, traverses the perineal strait, as in a face presentation.

The disposition which the inclined plane of the cervix uteri impresses on the vertex in this position, continues M. Guillemot, is a frequent cause of a similar transmutation above the abdominal strait; thus the slight backward inclination of the head which always exists in these positions, may correct itself when the uterine contractions, by acting on the foetus, keep the chin applied to the neck; but on the other hand, the reversion may be carried still further, or be entirely completed, if any obstacle impedes the head's descent into the excavation; finally, in cases of uterine obliquity, where the inclination of the vertex is greater, the backward tendency, instead of being effaced, would be increased, and the occiput would then ascend and the forehead descend.

Like the author quoted, I admit the fact, though a rare one, but I cannot acknowledge, like him, the truth of the following proposition; *i. e.*, that if the conditions of transmutation which then exist may be appreciated by a comparison of the face labours with those of the occipito-posterior positions, we should not depart far from the truth (*I believe it would be a wide departure*) by announcing that, in every three occipito-posterior positions, one of them would give rise to a face presentation.

Lastly, whatever may be the mode of the head's delivery in the right posterior occipito-iliac position, the occiput always inclines towards the internal surface of the right thigh, and the face is directed to the left one; this external movement (*restitution*) results from the internal rotation of the shoulders, in consequence of which the left shoulder, which was originally the anterior, gets under the arch of the pubis, and the right one into the hollow of the sacrum, and then the shoulders and the remaining part of the trunk are expelled in the manner already stated.

The great care we have taken in describing the natural labour in these two varieties of the two fundamental positions, will absolve us from repeating it anew in the other varieties.

In fact, the left *transverse* occipito-iliac position does not differ from the *anterior* one; unless, perhaps, the movement of rotation, which brings the occiput in front, is somewhat more extended; and what we have stated concerning the two modes of termination in the *right posterior* occipito-iliac position applies equally well to the *left posterior* one; but we must add that the movements of rotation will then take place from left to right, since the occiput is primitively turned towards the left side.

Lastly, in the other two varieties, the *right anterior*, and the *right transverse* occipito-iliac ones, the mechanism is still the same as in the corresponding varieties of the left occipito-lateral position.

Remarks.—From the foregoing, the reader will see that, in order to study the mechanism of labour in the vertex positions, we have

been obliged to consider each of the periods (or stages) composing it separately. Thus, we first examined the movement of flexion, then of descent, next the interior rotation, the extension, and the exterior rotation ; but it must not be supposed that these different movements occur successively, one after the other, in the order just described. Because, 1. The forced flexion spoken of as happening before the descent, frequently only takes place simultaneously with the latter. Often, indeed, the head is not flexed, until the descent is completed, and it encounters the resistance from the floor of the pelvis ; and then only in the majority of cases is the flexion carried to its highest degree. Yet more, we can imagine that this would nearly always be the case, since the head is engaged in the excavation in most women long before the commencement of labour ; and even in those cases where it is still above the superior strait at the time of the membranes being ruptured, the presenting diameters will allow it to traverse the upper part of the excavation without meeting any marked resistance.

The movement of flexion likewise presents some irregularities ; for instance, it is not at all unusual, more especially in the occipito-posterior positions, for the chin, instead of approaching the chest, to depart from it ; and, consequently, the head becomes extended, and the anterior fontanelle gets towards the centre of the excavation by degrees. However, this anomaly is usually temporary, for the head is flexed anew when it reaches the pelvic floor.

In some rare cases, the opposite of the preceding, the posterior fontanelle occupies the centre of the excavation, either because the flexion has gone beyond its usual limits, or else, because the trunk is inclined backwards ; but here, also, the resistance from the perineal floor gradually brings back the head to its regular situation. (*P. Dubois.*)

2. The rotation sometimes commences prior to the head's arrival at the inferior strait, and before the descent is completed. So that, in such cases, the three first stages of the labour occur at the same time ; thus the head is flexed, descends, and rotates all at once.

Some curious varieties of rotation are occasionally met with, which should be known to the student. For instance, it may be incomplete, the head still retaining a great obliquity pending the whole duration of its disengagement ; or it may not take place at all, which happens, as we have already seen, in certain occipito-posterior positions, or it may also occur in the transverse ones. In this latter variety, which is the rarest of all, the occiput and the forehead disengage alongside of the internal surface of the ischiatic tuberosities ; the occiput escapes first, and then the forehead by a movement of extension analogous to the ordinary mechanism. Madame Lachapelle reports having observed three cases of this kind. In some exceptional instances, the rotation surpasses the ordinary limits ; thus, for example, if the occiput is placed in relation with the right sacro-iliac symphysis at the beginning of the labour, it may successively correspond with the right extremity of the transverse diameter, the posterior face of the right acetabulum, the

symphysis pubis, and the *left cotyloid cavity*; and then, after a moment of repose, it retrogrades and places itself once more behind the symphysis. M. P. Dubois originally pointed out this fact, and I have twice since had an opportunity of verifying its truth.

Again, the rotation by which the occiput is brought in front, sometimes only takes place just as the head is overcoming the final resistances from the soft parts; on one occasion, I observed and pointed out this fact, in a primiparous woman, to all the students then present at the clinique; the child's head was in the right posterior occipito-iliac position, and it had descended to the pelvic floor and had cleared the inferior strait without a conversion taking place; the perineum was forcibly distended, the vulva widely dilated, the parietal protuberances were engaged, and the occiput had but a few lines to pass over in order to escape at the anterior perineal commissure; when, under the influence of a new pain, the head rotated briskly, the occiput gained the front, the forehead simultaneously rolling into the perineal concavity, and the labour terminated almost immediately.

The rotation within the excavation is certainly one of the most curious movements executed by the foetal head during the whole process of a natural labour; indeed, from what we have hitherto stated, it must be evident that, whatever be the primitive relations of the occiput with the various circumferential points of the superior strait, it finally succeeds in getting under the symphysis pubis.* Now, so far as we know, the physical cause of this movement is nowhere given in the writings that have been published on the subject prior to M. P. Dubois, who has paid particular attention to this point; and who, after refuting the influence of the inclined planes, advanced by the older accoucheurs, as the cause of the movement, adds, "This cause evidently resides in the combination of a great number of elements, viz., on one hand, the size, form, and mobility of the parts which are expelled, and, on the other, the capacity, the shape, and the resistance of the canal traversed by them; and such is the influence of this association, that the foetal parts place themselves in the most favorable conditions for delivery: thus, if an active resistance is made to them at one point, they withdraw from that, and seek another where there is more space and liberty. The mobility of the traversing parts, and the extreme lubricification of those which are traversed, render all this very simple and intelligible. In fact, every accoucheur must have remarked that, in those instances where the sacro-pubic diameter is contracted, the foetal head, if oblique before the labour, constantly places itself then in a transverse direction, that is, in one offering the least possible dimension

* M. Nægèle has only known the occiput to disengage posteriorly seventeen times out of twelve hundred and forty-four occipito-posterior positions; and even in those cases it was always possible to appreciate the exceptional circumstances that had favored this irregularity; such as an amplitude of the pelvis, or numerous former labours, lacerations of the perineum, or the softness, flexibility, *reducibility* and want of consistence of the head, or an extreme smallness of the child, the presence of twins, &c. &c.

to the vitiated diameter ; and this fact is nothing else than a very simple effect of those same causes, of which the rotation, when extensive, is a very complicated consequence." (*Journal des Connaisances Medico-Chirurgicales.*)

M. P. Dubois further relates the following experiment in support of his explanation of the process of rotation : "The uterus of a woman who died soon after delivery, which still remained flaccid and voluminous, was freely opened near the os uteri, and her foetus was placed in it near this soft, gaping orifice, in the right posterior occipito-iliac position of the vertex; then several midwife students, by compressing the child, and by pushing from above downwards, caused it to enter the excavation without difficulty ; but it required a much greater effort to make the head traverse the perineum and clear the vulva ; and it was not without some surprise that we noticed, in three different trials, that, as soon as the head passed the external genital parts, the occiput was in front and to the right, while the face turned backwards and to the left. Again, we repeated the experiment a fourth time ; but now the head passed the vulva, with the occiput remaining posteriorly. We then took a stillborn child, delivered the preceding day, which was much larger than the other, and placed it in the same conditions as the first, and on two successive trials the head cleared the vulva after having performed the rotation ; on the third and succeeding essays it was disengaged without executing this movement ; that is, the process of rotation continued until the perineum and vulva had lost the power of resistance that produced it, or which, at least, had determined its accomplishment." (*Loco citato.*)

I do not know whether the explanations and experiments of M. P. Dubois will render the cause of rotation *very simple and intelligible* to every reader ; but, as to myself, I am constrained to admit that they describe and confirm the fact, but they do not explain it. True, there can be no doubt that the cause of rotation is to be sought for in the form and direction of the canal, and in the shape and size of the foetal head ; but let us see if it would not be possible to ascertain the influence of those divers circumstances more precisely.

The uterus is situated very nearly in the axis of the superior strait, and therefore the sum of its expulsive forces, or, to speak more clearly, the sum of the contractions, may be represented as operating according to the direction of its axis. Now, supposing the head to be in the right posterior occipito-iliac position, the occiput, urged on by the uterine contraction transmitted by the spine, will descend in the line of its axis ; that is, from above downwards, and from before backwards ; and it will continue on until it is arrested by the resistance from the inferior part of the sacrum, or from the soft parts constituting the floor of the pelvis ; for, however inconsiderable this resistance may be, it is there arrested, and thenceforth the occiput must necessarily change its direction. In fact, the resistance may be represented by a force operating in a direction perpendicular to the surface whereon the head strikes, and which

might be applied to the foetal cranium at its point of contact with the posterior plane of the excavation. This point of contact, in the case before us, is evidently the right lateral and posterior part of the head, which strikes against some point in the hinder wall of the excavation; of course, the child's head, or rather the occipital extremity of it, is from that time subjected to two different forces, one of which acts from above downwards, before backwards, and slightly from left to right (this is the uterine contraction), and the other from behind forwards, and a little from below upwards (this is the resistance, or force, represented by the perpendicular to the surface of the sacrum impinged upon by the head). By representing this force derived from the resistance, and that from the uterus communicated through the spine in the line of axis of the superior strait by a parallelogram, we obtain a diagonal or resultant from these two forces that points out the direction of the movement that is to take place. Now, by constructing such a parallelogram, we observe that the occiput must evidently pass forwards, downwards, and to the right; since the diagonal or resultant of the forces is directed from behind forwards, from above downwards, and from left to right; and hence the extent of this progression, and the rapidity of its execution, are always proportionate to the energy and duration of the contraction and to the resistance offered by the pelvic floor. This also explains why the rotation, after being a long time delayed, is sometimes suddenly and completely perfected during a violent pain; as also why, under other circumstances, and more particularly in those instances where the pains are feeble or short, this movement only takes place gradually, and requires for its entire completion a much longer period and a variable number of contractions.*

Lastly, this theory enables us to explain those differences noticed in the rotation according to the part of the excavation where it commences; thus, it has been stated that usually the process only begins when the child's head reaches the pelvic floor; indeed, this would naturally result, since until that period the head, from being strongly flexed, and offering its smallest diameters to those of the strait, had encountered no resistance whatever from the osseous portion of the pelvic canal; but we can readily imagine that with a voluminous head, or a badly developed pelvis, or the superior strait too much inclined, or the uterus too oblique, the resistances might be felt much sooner, and then the occiput, although scarcely in the excavation, would strike against the posterior wall and be compelled to

* This movement takes placee gradually, says M. Nægèle, in a slow spiral direction; for if the vaginal touch be resorted to during the pain, the small fontanelle, which was originally directed to the right and posteriorly, will then be found to place itself altogether to the right towards the descending branch of the ischium; but, in proportion as the pain diminishes, it returns step by step to the place it oecupied before. Again, if the finger be kept in contact with the head, the posterior fontanelle, whieh in the absence of a pain is wholly to the right, will be observed, during the latter, to turn forwards towards the obturator foramen, from whence it again departs as the pain goes off; and it keeps up these alternate movements for some time, until finally it becomes fixed opposite this foramen.

follow the new direction impressed upon it by the resultant (diagonal) of the forces.

3. The trunk participates, as we have elsewhere stated, in the rotation of the head; but this, however, may not occur, or rather two cases reported by M. P. Dubois would seem to prove as much.

4. The rotation of the shoulders after the head is delivered may also present two opposite conditions; that is, it may either take place in a partial manner or else not at all, and the shoulders then disengage transversely. This last instance is not very unusual, and in my opinion it clearly aids in confirming the views of M. Gerdy on the process of rotation; for when it does not occur the head undergoes no rotation, and the latter should always execute this movement, however great the immobility of the shoulders, if the process is a consequence, as Baudelocque supposed, of the twisting in the neck.

Sometimes, on the contrary, the same movement that rendered the shoulders transverse before the delivery of the head, continues after the expulsion of this latter in such a way, that the shoulder which was originally anterior instead of retrograding towards the pubic arch passes behind, while the other that was primitively posterior gains the apex of this arch, and the face then turns towards the internal surface of the right thigh in the right occipito-iliac, and to the left thigh in the left occipito-iliac positions.

§ 4. INCLINED, OR IRREGULAR VERTEX PRESENTATIONS.

Under the name of inclined, or irregular presentations of the vertex, we have designated those (page 310) in which the sagittal suture, instead of being placed very nearly in the axis of the superior strait, looks either to the fore or hinder part of the pelvis, as well as those where the forehead or the occiput is placed at the centre of the strait, in consequence of the head's incomplete or exaggerated flexion. Baudelocque, and his school, have considered these as so many distinct presentations, which they have accordingly denominated the presentations of the side of the head, or ear, forehead, and occiput; but we shall follow the example of Lachapelle, Nægèle, Stoltz, and P. Dubois, by including them all in the general term of the vertex presentations. In fact, they scarcely ever impede the course of the labour, and seldom modify its mechanism.

For example, let us take the first position (the left anterior occipito-iliac), and suppose it to be inclined on its anterior (right) parietal region; then the right parietal protuberance corresponds to the centre of the strait, and the sagittal suture looks towards the first bone of the sacrum. When the contractions take place, the head will descend just as in a natural position, excepting that, upon its entrance into the excavation, or during the first half of the descent, it will undergo a movement of correction, in consequence of which the posterior parietal boss will describe an arc of a circle around the anterior one as a centre, and both will soon appear on the same plane, and then the labour terminates as usual. Of course, this process of correction would operate in the opposite direction if

the inclination were on the posterior parietal region instead of the anterior; however, the rectification is then much more difficult, owing to the direction of the expulsive force, which has a continual tendency to augment the inclination.

In those cases where the flexion of the head is incomplete, as in the forehead presentations of Baudelocque, it will become perfected during the descent, and the same will occur when it is exaggerated (the presentation of the occiput of Baudelocque); the forehead becoming lower and lower.

§ 5. PROGNOSIS.

The vertex presentations are the most favorable of all, and this statement will be more fully verified when we study the prognosis of the other presentations.

But the vertex positions are not all equally advantageous; and we may lay it down as a general proposition that those in which the occiput is turned towards some point on the anterior moiety of the pelvis, at the beginning of the labour, are more favorable than when it looks posteriorly.

In the latter case, as hitherto demonstrated, the accouchement may terminate by two varieties of mechanism which are altogether different from each other; that is, the occiput either comes in front, so as to get behind the symphysis pubis, or else it remains posteriorly throughout the labour.

Whenever the posterior position converts itself into an occipito-pubic one, the very considerable extent of the rotation then demands a far more energetic contraction on the part of the womb than where the occiput was originally nearer to the anterior arch of the pelvis, and the labour is, therefore, somewhat more painful, though in general it is not serious.

But the expulsion becomes particularly difficult when the head maintains its primitive position, and does not rotate, as we shall endeavor to prove; though first, let us establish as an axiom, the evidence of which no one can deny, that, *whenever a straight and an inflexible trunk has to pass through a curved canal, it will do so the more readily as the canal is shorter and less curved, or the trunk itself is the more diminutive.*

Now, in the folded condition exhibited by the child's body in vertex presentations, the trunk, which represents the great longitudinal axis, may be divided into two portions; one of which, constituted by the spine and the inferior extremities, is flexible, and can accommodate itself to the pelvic curvature; and, therefore, its expulsion should offer no difficulty, while the other, corresponding to all the space between the vertex and the atlido-axoid articulation, forms a straight, inflexible stem. Now it is evident that in the primitive occipito-anterior positions, or in the posterior ones, which afterwards become converted into anterior, that portion of the straight inflexible stem which the long axis of the fœtus represents, is reduced to its smallest possible dimensions, and it only has to traverse *the shortest*

and least curved part of the canal, I mean the symphysis pubis whence one extremity is clear at the inferior, while the other is scarcely engaged at the superior strait. But does the same thing occur in those occipito-posterior positions that remain posterior until the end of the labour?

We know the occiput, in this latter case, is the first to escape at the anterior perineal commissure, and it therefore has to traverse all the front surface of the sacrum and of the greatly distended perineum. But as the child's neck is not long enough to thus measure the whole posterior wall of the pelvic canal, the chest must engage in the excavation soon after the head, and the latter, as a necessary consequence, must be forcibly flexed on the breast. Hence, owing to this constrained flexion, the straight inflexible stem extends not only from the vertex to the atlido-axoid articulation, but even to the first dorsal vertebræ, and it is, therefore, *much longer than usual*; yet more, it has to traverse the whole anterior sacral face prolonged by the perineum, that is to say, *the longest and the most curved part of the pelvic walls*.

Whence it is evident that the expulsion of the foetus in this case must be much more tedious and painful than in the others; however, we cannot admit that the accouchement is absolutely impossible. M. Capuron, who still professes this latter belief, supposes (the occiput remaining posteriorly) that the labour can only take place when the foetal head is unusually small, or the pelvis very large, but this opinion is opposed at the present day by too great a number of facts, to require us to refute the theoretical proofs upon which he relies.

There is yet another reason for the occipito-posterior positions being more difficult than the anterior ones; a reason to which sufficient importance has not, in my estimation, been attached, I allude to the mode in which the uterine contractions are transmitted. Observe, in fact, when the occiput is in front, that these are communicated to it by the spine, nearly in a direct line, whilst they only reach it when this part is posterior at the close of labour, by describing a well-marked curve, owing to the extreme flexion of the head on the chest.

Hence, there would be, as every one knows, a great loss of force; and observe further, that such loss coincides precisely with an occipito-posterior position, which, for the reasons before stated, offers, of itself, still greater difficulties in the delivery.

Now, to have demonstrated that the accouchement is longer and more difficult in those cases where the occiput remains posteriorly, is, in effect, to prove that it was at the same time more dangerous both to the mother and child.

In fact, it is in such instances, especially, that a rupture of the perineum is to be feared; for it is then very difficult indeed to prevent such an accident; it is then, also, those central lacerations of the perincum are apt to take place, in which the posterior commissure of the vulva and the sphincter ani remain intact, while the

fœtus forces a way for itself through the distended perineum. Again, the head, by remaining a long time in the excavation, compresses the neighboring parts, thereby giving rise to retention of the urine, to eschars, and to urinary or stercoital fistulæ.

And apart from all these inconveniences, it is well known that the labour cannot be prolonged without danger; that the woman becomes fatigued and exhausted, and that the child remains compressed and painfully flexed.

Whenever a foetal head is examined just after its delivery in a vertex position, there is always to be found a more or less considerable tumefaction on some point of the vertex, however soon the labour may have terminated after the membranes were ruptured; and the size of this tumor bears a direct proportion to the greater or less rapidity in the progress of the accouchement. Its seat is so constant that it is easy to determine in what position the child was born by a simple inspection.

For instance, when the occiput escapes under the pubic arch, the tumor is always located on the superior-posterior angle of one of the parietal bones, i. e., on the right parietal in the left occipito-iliac, and on the left one in the right occipito-iliac positions; and in those rare cases, where the occiput is disengaged posteriorly, it is usually situated about the centre of the vertex, often indeed on the anterior fontanelle; in a word, it is mostly developed at the point which corresponded originally with the os uteri, and subsequently, with the void under the pubic arch. The mechanism of its production is very easily understood, for the whole circumference of the head is strongly compressed, leaving only a single point corresponding to the void in the pelvis or arch, which is not subjected to that pressure, and which must, therefore, become the seat of a sero-sanguinolent infiltration just in the same way as the skin does, when, by the application of a cupping-glass and the creation of a vacuum, it is thereby protected from the atmospheric pressure that operates on every other part of the body.

This tumor, when large, is the result of a slow and painful accouchement; it is always single; and may be distinguished from the cephalæmatoma,* with which it was for a long time confounded, by the following characters: the former (or the tumefaction caused by labour) is irregularly circumscribed, whilst the limits of the latter are very distinct: in the former, the hairy scalp is of a well-marked violet color, the tumefaction has an œdematosus consistence, retaining the impression of the finger, and is not fluctuating, whilst the skin of the cephalæmatoma is colorless, presenting a well-marked fluctuation, occasionally even some pulsations, and its base is limited by a prominent osseous border; in some instances, however, this border is not developed for several days after the commencement of

* This term has been applied by Prof. Nægèle, of Heidelberg, to a sanguineous tumor of the head, varying in size from a small nut to a hen's egg. Its centre is sometimes so much depressed as to be mistaken for a perforation of the bone.—*Translator.*

the disease ; but the pulsations and the border are never met with in the other variety.

Lastly, the semi-sanguineous œdema of the cranium in new-born children appears immediately after birth, and disappears in from twelve to forty-eight hours ; but the cephalæmatoma, on the contrary, scarcely ever appears until some hours after the delivery, and then lasts for several weeks.

Dr. Fortin relates, however, that he was able, in one instance, to detect the presence of this latter as large as a pigeon's egg, before the accouchement was terminated.

The sanguineous tumor, just spoken of, does not exist when the foetus dies prior to or in the commencement of the labour ; and the inferences which the medical jurist can draw from this fact, in cases where it is desirable to fix the period of death in a recent child, are clearly obvious.

ARTICLE III.

OF THE PRESENTATION OF THE FACE.

It may happen when the cephalic extremity presents at the superior strait, that the head is not only extended, but it is also turned back towards the child's posterior plane, which situation constitutes a face presentation ; still, this variety is very rare : thus, it has been ascertained, from the most numerous statistics, that the foetus presents by the face, on an average, once in two hundred and fifty to three hundred labours.

We have admitted two fundamental positions for this presentation ; in one of which, the chin looked towards some point on the right lateral moiety of the pelvis, the *right mento-iliac* ; and in the other, it was directed to one of the points on the left lateral moiety, the *left mento-iliac* position ; and we may repeat for the face what was said concerning the vertex presentations, namely : that there is no portion of the superior strait's circumference, with which the chin may not be in relation at the commencement of the labour ; nevertheless, we shall include all these shades of position in three principal varieties on each side ; that is, for each fundamental one, we have the *anterior*, the *transverse*, and the *posterior* varieties.

The right mento-iliac positions are somewhat more frequent than the left ; about in the proportion of thirty-one to forty-one, if we may judge from the statements of Madame Lachapelle ; but the *transverse variety* is far more common than all the others.

The face presentations are either classed as primitive or secondary, according to whether they existed before the commencement of labour, or have been since produced by ill-directed contractions. In fact, these latter have generally been considered as the more frequent of the two, but we shall have occasion to show the value of this supposition hereafter.

§ 1. CAUSES.

The obliquity of the womb, according to most authors, is the cause of face presentations, though all of them do not interpret its influence in the same manner; for instance, agreeably to Deventer, if the womb be inclined to the right side, and the vertex be placed in the left occipito-iliac position, the contractions, taking place in the direction of the uterine axis after the membranes are ruptured, will force the foetus from above downwards, and from right to left, so that the vertex will strike against the left border of the superior strait, and the head, being thus arrested, will fall back on the child's dorsum. Baudelocque, though admitting the right uterine obliquity, supposes that a right occipito-iliac position of the vertex exists at the same time; for a face presentation is scarcely ever observed, says he, without the womb's obliquity occurring on the side which corresponds to the occiput. In this instance, the foetus is lying on the womb's right lateral wall before the labour sets in, and the head, obedient to its own specific weight departs slightly from the chest; but when the contractions manifest themselves after the rupture of the membranes and the discharge of the waters, the direction of the forces transmitted to the head is such that, instead of falling on the occiput, as they would were the head flexed, they are spent on the forehead, and tend to force it down; but a depression of the latter compels the occiput to ascend, that is, it causes an extension of the head.

The reader will perceive that all these explanations suppose that the face presentations are uniformly the consequence of deviations from a vertex position; but this, however, is not always the case, for the face may often present directly at the superior strait, even before the commencement of the labour or a rupture of the amniotic sac. For instance, Madame Lachapelle, when making an autopsical examination of two women who died at full term, found the foetus presenting by the face; moreover, of the eighty-five face presentations collected by the authors of the *Dictionnaire de Médecine*, forty-nine had been clearly made out, and announced as such before the membranes were ruptured; and further, of those eighty-five women, there were but three in whom the uterus was in a state of well-marked obliquity, and only one where the quantity of the amniotic liquid was considerable enough to attract attention. Whence the conclusion is evident from these and many other facts, that the face presentations, in the great majority of cases, are not determined by a previous inclination of the foetus, nor by a vicious direction in the uterine contractions, but that they are primitive, and therefore the causes which produce them are beyond our knowledge.

The reason for the greater frequency of the right mento-iliac position must evidently be owing, when secondary, to the greater frequency of the right lateral obliquity that produces it. There are several causes, according to Madame Lachapelle, which contribute to render the transverse positions more common than the others; as 1, the form of the superior strait and the dimensions of its diameters,

which correspond better in this direction with those of the face; 2, the frequency of oblique or transverse positions, which, when the head falls back, evidently give rise to transverse positions of the face; 3, the frequency of *lateral* obliquities of the uterus, or partial ones of the child, if, as Gardien admits, the foetus can be oblique independently of the womb.

§ 2. DIAGNOSIS.

The diagnosis of face presentations is made out the more or less easily, according to the period of labour when the examination is made; if before the membranes are ruptured, the part in general is too high, and too difficult of access, for it is almost impossible to reach the presenting portion when the membranes are the least tense. Again, the reversion of the head not being yet completed, the forehead is the lowest part, and the one the finger encounters in performing the touch; whence, by feeling a hard, rounded body furrowed by a membranous interval (the coronal suture), we might very readily mistake it for a vertex presentation. But if the flaccid and folded membranes can be depressed without difficulty, or still better, if they have been recently ruptured, the diagnosis becomes more easy; for then we find towards one side of the pelvis a rounded, solid surface, the forehead, traversed by a suture to which a transverse depression leads, next a triangular elevation whose base, looking in an opposite direction from the forehead, exhibits two openings, the nares, and beyond this a transverse fissure bounded by the superior and inferior maxillary arches. On the sides of the median protuberance, two little soft tumors (the eyes) are felt, surrounded by an osseous circle; and lastly, when the head is low down, an ear may be detected behind the pubis. When the presentation is once determined, the position is easily made out, for the opening of the nostrils must evidently look towards that part of the pelvis which corresponds with the chin; though, where a long time has elapsed after the membranes were ruptured, new causes of difficulty are met with. For instance, the face, which now corresponds to the open space in the pelvis, becomes the seat of a considerable tumefaction; and the cheeks, from being greatly swollen, and at the same time compressed on the sides, swell out, and lie close to each other in front, thus leaving a deep fissure between them, in the bottom of which the distinctive characters of the face are entirely concealed; and such a fissure might very readily be mistaken for the one between the nates, which are then confounded with the tumefied cheeks. Further, the lips are also swelled, wrinkled, and turned in, in such a manner as to offer a rounded orifice instead of the usual transverse fissure, and this orifice has been taken, in some instances, for the anus; hence, in such cases, a careful examination seems to be necessary to avoid an error which, according to authors, has not unfrequently been committed.

§ 3. MECHANISM.

As those varieties, in which the chin looks towards one extremity

of the transverse diameter, are found to be the most frequent of all, we shall follow the example of Nægèle, Dubois, and Lachapelle, by taking one of them as the type in our description of the mechanism of natural labour by the face, and shall commence with the right mento-iliac, since this is the more common of the two.

1. Mechanism of Natural Labour in the right transverse mento-iliac position.

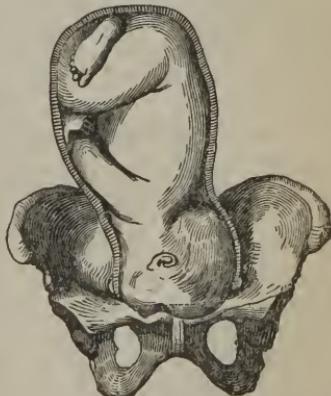
Before the amniotic pouch is ruptured, the head, as a general rule, is but moderately extended, whence the forehead is nearly always placed at the centre of the superior strait, and the chin corresponds to the right, and the bregma to the left extremity of the transverse diameter; consequently, the diameters of the head hold the following relations to those of the pelvis: the mento-bregmatic corresponds to the transverse diameter of the basin; the bi-temporal to the antero-posterior one, and the mento-bregmatic circumference is parallel to the periphery of the superior strait; and, therefore, the pelvic axis traverses the head in the direction of the occipito-frontal diameter.

The child's posterior plane looks directly to the mother's left, and its anterior plane to her right; its right side is in front, and the left one is behind.

As soon as the membranes are ruptured, the mechanism of the expulsion begins, and here, as in the case of the vertex, it is composed of five stages, i. e., the forced extension, the descent, the rotation, the flexion, or disengagement, and the exterior rotation; and these comprise the movements which the head undergoes in face positions.

A. Forced Extension.—The head being already moderately extended on the back, its extension will be completed during the first uterine contractions that take place after the discharge of the waters, owing to the resistance it will then meet with; but this forced extension changes but very little the relations of its diameters to those of the pelvis (*vide Fig. 57*); for instance, the fronto-mental has taken the place of the mento-bregmatic, and is now parallel to the transverse diameter of the strait; the bi-temporal has not changed at all; the facial, or fronto-mental circumference, corresponds with the periphery of the superior strait,* and the pelvic axis traverses

Fig. 57.



The face in the right transverse mento iliac position, after the forced extension.

* M. Nægèle further supposes that the face is inclined, relatively to the superior strait, and that the anterior cheek is the most dependent part, &c. The reasons upon which our objections were founded to such an inclination in

the head in the direction of a line passing from the posterior fontanelle to the child's upper lip.

B. Descent.—As soon as the head is freely extended, it engages in the excavation, and descends *as far as the length of the neck will permit*. This last sentence requires a short explanation; for, in the vertex positions, we have already seen that the head descended to the floor of the pelvis in such a way as to traverse all the space between the superior and inferior straits, without changing its position. But in the transverse position before us, it is clearly evident that

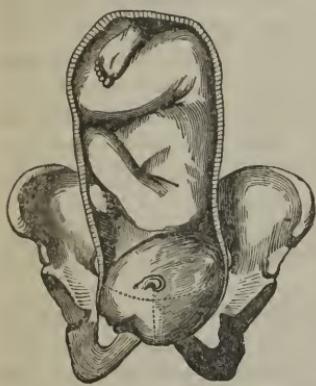
the face can only reach the pelvic floor under one of the following conditions: that is, either the chest will engage along with the head in the excavation, or else it will remain above the superior strait; the face descending alone as far as the inferior one; that is to say, the forehead reaching the level of the left, and the chin that of the right tuber ischii; but then the neck must necessarily elongate enough to measure the whole length of the pelvis at its lateral portion, which is three inches and three-quarters. But neither of these two conditions can be realized, and therefore the head will not be able to reach the pelvic floor; and it

Fig. 58.
The face in the same position, though more fully engaged.

is for this reason that we say the face only descends *as far as the length of the neck will permit*; whereby the descent is interrupted.

c. Rotation.—The head then undergoes a movement of rotation, during which the chin rolls from right to left, so as to get behind the symphysis pubis, while the forehead rotates from left to right, and from before backwards, in order to place itself in the concavity of the sacrum. When the execution of this movement is effected, the descent becomes completed; for the shortness of the neck, or the too great extent of the ischium, formed heretofore the sole obstacle; for if, by the process of rotation, the neck, which can be no further stretched, is brought into apposition with a part of the pelvic wall short enough for it to span its whole length, the descent may evidently be completed; that is, the breast still remaining above the superior strait, the chin may descend as low as the inferior one, and this is precisely what does take place; for, as the trunk participates in the head's movement of rotation, the neck gets behind the symphysis pubis at the same time that the chin reaches the inferior termination of this symphysis, which is short enough to allow the child's neck to subtend its whole length.

the vertex presentations, oblige us also to reject it in the positions of the face, for we believe that the facial circumference is most usually *parallel to the plane*, as stated in the text.



D. Flexion.—The process of flexion begins as soon as the descent is achieved; indeed, we may remark that when the chin passes behind the symphysis pubis, the forehead goes into the hollow of the sacrum, and it therefore has to traverse (in order to arrive at the inferior strait simultaneously with the chin) the whole anterior sacral face, that is, about five and a quarter inches, whilst the chin only descends the length of the symphysis, or one and a half inches; in a word, this is found just in the same condition as the posterior extremity of the bi-parietal diameter in vertex presentations; and, like it, the forehead has to describe an arc of a circle around the chin as a centre. Now, this arc cannot be produced without a certain degree of flexion of the head. Whence it appears that, in this transverse position of the face, *the descent is completed at the same time that the rotation is taking place, and the process of flexion beginning.*

Again, if the relations of the head's diameters to the inferior strait be then examined, we shall find that the same ones are concerned as at the beginning of the labour, before the complete extension had occurred; for instance, the mento-bregmatic corresponds to the antero-posterior diameter, the bi-temporal to the transverse, and the axis of this strait passes through the occipito-frontal diameter; and thus it should be; since, by the commencement of flexion, the head is replaced in the state of semi-extension it had when the labour began.

The chin, under the influence of the uterine contractions, next engages below, and continues passing under the inferior part of the symphysis, until the forepart of the neck, by coming into apposition with the pubis' posterior surfaces, arrests its forward progression; but, from that time forth, the expulsive force is exerted on the other extremity of the occipito-mental diameter (owing to its action on the chin being destroyed by this resistance), the occiput is pushed down, and the head is thereby compelled to complete its flexion or disengagement. Of course, the perineum becomes greatly distended, and the forehead, the bregma, the vertex, and the occiput successively appear before its anterior commissure.

During the process of flexion, the head resembles a lever of the third kind, the fulcrum being at the præ-tracheloid region, placed directly under the symphysis pubis, the power at the occipital foramen, and the resistance at the occiput; wherefore, pending this movement, the præ-trachelo-frontal, the præ-trachelo-bregmatic diameters, etc., clear in turn the antero-posterior one of the inferior strait.

E. Restitution.—This differs in nowise from the exterior rotation described by the head in the vertex presentations; for

Fig. 59



Various degrees of the head's disengagement (in the same position), the occiput departing more and more from the shoulders.

here, also, it is a consequence of the movement executed by the shoulders, in order to place themselves in the direction of the antero-posterior diameter of the strait.

In addition to the above, the mechanism of face labours sometimes presents a variety, which we purposely omitted for fear of interrupting the regular description ; thus, we stated, that the head completed its extension and descended, but that this movement of descent was interrupted by the rotation ; since, after this latter had commenced, the descent was completed, and at the same time the *flexion began*. Now all the difference rests on this last point ; for in practice a considerable number of cases, more particularly of the mento-posterior positions, are met with, in which the following phenomena are observed ; the second movement, or the descent, actually commences, but it is checked by the shortness of the child's neck. In this dilemma, a certain degree of flexion takes place *before* the rotation occurs, in consequence of which the forehead descends to the pelvic floor, and the mento-bregmatic diameter places itself anew parallel to the transverse diameter of the excavation ; then the process of rotation comes on, which carries the chin behind the symphysis, and the labour terminates in the manner just indicated.

2. *Mechanism of Natural Labour in the left transverse mento-iliac position.*

In this position, the foetal expulsion absolutely takes place in the same manner as in the preceding case. Only the chin, as well as the child's anterior plane, is to the left ; and hence the movement of rotation occurs from left to right instead of right to left, but all the rest is precisely similar.

The same is also true of the two varieties denominated the right and the left anterior mento-iliac positions ; and further, the two other varieties (the right posterior, and the left posterior mento-sacro-iliac) exhibit an identity of mechanism in a vast majority of cases ; that is to say, the head, having reached a certain depth in the excavation, then undergoes the process of rotation, which converts the position into a mento-pubic one ; indeed, the necessity for this movement is far more evident here than in the mento-transverse positions, since the depth of the pelvis is much greater behind than on the sides.

It may, therefore, be laid down as a general, nay, as an almost absolute rule, that, in the face positions, whatever may have been the chin's relations at the commencement of the labour with the circumference of the superior strait, there must be a process of rotation, whereby the chin is to be brought under the symphysis pubis, in order for the accouchement to terminate spontaneously. Hence, in the numerous varieties of this position before admitted, the mechanism of the labour only differs in the greater or the less extent of the process of rotation ; an extent evidently varying according to the point with which the chin was primitively in relation at the upper strait.

Remarks.—Nevertheless, the mechanism of the face positions occasionally offers some anomalies, that require a more special notice.

For example, the process of rotation just described, whose object is to bring the chin constantly towards the symphysis pubis, and which has been spoken of as being absolutely essential to the spontaneous termination of the labour, may not be executed. But such very rare exceptions do not in the least discredit the general principle before laid down, for they may all be referred to those instances where the head's dimensions are small relatively to those of the pelvis; or else to those cases where the position of the face has been spontaneously converted into one of the vertex. True, Madame Lachapelle has known the face to escape from the vulva in a transverse direction, or nearly so, in two or three instances; but she carefully adds that they were very rare exceptions.

Now, to understand this movement of rotation, it is only necessary to recall our remarks concerning the mechanism of labour; thus, for instance, it has been shown that the descent could not be completed in the transverse positions, until the chin had turned towards the pubic symphysis; and further, that when the head is extended, the resistance of the forces transmitted by the spine, falls very nearly on the chin, and tends to engage it still more. Well, in this situation, the expulsive force is either perpendicular or oblique to the plane of the resistance; if the former, the uterine efforts are lost, since they do not contribute in any wise to the progress of the labour; but, if the force is oblique to the resistance, it is either from before backwards, or from behind forwards; in the former case, it will have a tendency to carry the chin backwards; but a movement of this kind will not aid in the chin's engagement, since the pelvic wall has a much more considerable height nearer the median sacral line; and hence the efforts are still lost.

In the latter, on the contrary, the oblique force, by operating from behind forwards, tends to carry the chin in front; that is, towards a portion of the pelvic wall, which becomes shorter and shorter as it advances anteriorly, and thus facilitates the descent.

But, after all, what is the direction of the uterine force? Everybody knows that it changes at each instant, according to the woman's position, or the violence of her contractions; and, therefore, the womb may be successively found in all three of the directions above indicated, relatively to the resistant plane. If it is perpendicular to that plane, the efforts are lost; or, if oblique, from front to rear, the contractions are useless, for they can only be fully efficacious when acting on the chin from above downwards, and from behind forwards. But far be it from me to locate an intelligent force in the uterus; for it is only by groping along, so to speak, that the matrix finally acquires a proper direction, though, when the impulsion is once given, the force becomes more and more oblique, and consequently more active. And it is those *gropings* (excuse the term) which at times render the rotation so difficult and so tedious.

Again, it has been asserted, of latter time, that the process of rotation is quite as easy in the mento-posterior as in the mento-anterior positions. Now, if I have succeeded in making my views on

the cause and mechanism of this movement understood, the reader will readily comprehend that, in proportion as the chin is posteriorly, and more especially if towards the right at the same time, the greater will be the difficulty met with in its accomplishment.

2. As regards those varieties in which the chin looks backwards, we have already stated that it is necessary this part should come round in front, though some cases of mento-posterior positions, that terminated spontaneously, are found in the books, where the chin did not get under the pubic arch; but writers differ in their explanations of this anomaly. For instance, M. Velpeau takes as an illustration the mento-sacral variety, or the second position of Baudelocque, in which the chin is turned towards the sacrum's anterior face (though we may observe, in passing, that this position is scarcely admissible); and he remarks that, as the chin does not rotate in front, the following phenomena may then take place: the forehead engages behind the body or the symphysis of the pubis, while at the same time the chin gets below the sacro-vertebral angle, and the whole head descends into the excavation beyond the anterior fontanelle in front, and the face drags after it the front surface of the neck, and even the upper part of the chest behind. The occipito-mental diameter, which still represents the strait's axis very nearly, now begins to perform a see-saw movement from above downwards and from behind forwards. The chin, penetrating further and further towards the bottom of the excavation, though at the same time retained by the thorax, which cannot advance, forces the sagittal suture to slip down behind the pubis, and the forehead to gain the upper part of the inferior strait. The frontal bosses soon take a *point d'appui* on the perineum, and the posterior fontanellc descends in turn, and ultimately appears at the summit of the arch, when the head finally escapes from the vulva as it would in an occipito-anterior position; whence it follows, adds M. Velpeau, that the *occipito-frontal* is the greatest diameter which can present at the planes of the straits. But we cannot admit the truth of this last proposition; for if, as he says, the chin is in relation with the anterior sacral surface, and it penetrates more and more, while the occiput slips behind the pubis, it is evident that the *occipito-mental* diameter must, at a given moment, traverse the antero-posterior one of the excavation. Now, as this is clearly impossible, we have to reject M. Velpeau's explanation altogether. Besides, the cases observed by Smellie and Delamotte, which he cites in support of his theory, prove nothing at all; for, in both of those instances, the foetuses were *small and dead*, and the women had, on former occasions, been delivered of *voluminous children*.

M. Guillemot has explained the spontaneous termination of the labour in these cases somewhat differently; for when the chin does not rotate in front, the accouchement, agreeably to his idea, may terminate in two ways, namely; 1st, the forehead continues to descend and to engage under the branch of the pubis until the anterior fontanelle appears at the vulva, which progression permits the chin to advance forward and reach the *border of the perineum*; then the

process of flexion commences, &c. But we cannot conceive how, in the forced extension of the head on the thorax, it is possible for the chin to arrive at the anterior perineal commissure by traversing the whole posterior plane of the excavation, because, from all evidence, the breast must freely engage with the head, which is wholly impossible, unless it be a case of abortion.

2d. The accouchement by the face may be converted into one by the vertex; and this always takes place, he continues, in the following manner: the face being forcibly pressed on, and unable to escape through the perineal strait, has a natural tendency to pass towards those points that offer the least resistance. Here, *this condition is found above and behind*, whence the chin leaves the perineum and approaches the foetal chest by ascending along the hollow of the sacrum towards the sacro-vertebral angle, and the forehead following this movement corresponds to the sacrum in turn; the vertex is depressed by slipping behind the pubis, and, just at the moment when the chin applies itself to the child's breast, the occiput engages under the pubic arch. He further supposes the face to be sufficiently engaged for the chin to come in contact with the perineum; but, as we have already stated, this is impossible on account of the extent of the head and breast's conjoint diameters, both of which would then necessarily be engaged in the excavation.

But, even admitting the chin could descend so low, where is the power to make it subsequently rise up in the hollow of the sacrum, the cavity of which is occupied, whatever M. Guillemot may say to the contrary, by the freely engaged breast? For the uterine contraction, which is always transmitted by the spine, acts at first on the chin as a consequence of the head's reverted position (as M. Velpeau clearly recognized), and it is only when its power is inadequate to make the latter descend any further, that its action is transferred to the other extremity of the fronto-mental diameter, that is, to the forehead, which it then depresses, according to the theory of Guillemot. Again, even supposing that the chin may remount, it is scarcely possible to believe that it gets above the sacro-vertebral angle, and it must therefore constantly remain in contact with the anterior sacral surface; and, consequently, at a given moment, the occipito-mental diameter must traverse the antero-posterior one of the excavation.

In my estimation, therefore, we are not to understand this as the true mode by which the mento-posterior positions of the face are converted into occipito-pubic ones; indeed, among all the cases I have been able to consult, I have only found *three* in which the chin was in direct relation with the anterior face of the sacrum, viz., those of Smellie, Delamotte, and Meza (reported by Guillemot). Now, in the one furnished by Smellie, it is positively stated that the child was *small*, that the woman had a *large pelvis*, and that she was *usually delivered very promptly*; Delamotte says nothing about the head and the dimensions of the pelvis, in his case; and, lastly, Meza was obliged to apply the forceps, in the one reported by him; so, of course, that was no longer a spontaneous termination, for it

would be an easy matter to demonstrate that the application of the forceps may act in an altogether different manner, and even more advantageously, than the uterine contraction in this instance; besides, the reader will not forget that, in the first two cases, the children came away dead.

All the other observations may be referred either to the right or the left mento-sacro-iliac positions; and, in these latter, it appears to me that a spontaneous termination of the labour might occur without a simultaneous engagement of the chest and head; for instance, let us suppose that the child is in a right mento-sacro-iliac position; then, after the head's complete extension, the face will descend into the excavation as far as the length of the neck permits, and consequently the chin will reach the level of the great sciatic notch, the more so, as the form of this portion of the ilium, which is shaped like a cone, will favor the movement of downward progression. Having arrived at this notch, the chin will there encounter certain soft parts, which it can very readily depress, and this depression will be quite sufficient to augment the length of the oblique diameter of the excavation from a quarter to half an inch, thereby permitting the occipito-mental diameter to clear it, and the head to undergo the process of flexion, that will gradually bring the occiput under the pubic symphysis.

§ 4. INCLINED OR IRREGULAR FACE PRESENTATIONS.

The face does not always present so regularly at the superior strait, as to have its fronto-mental circumference parallel to the opening in the pelvis, since the same causes that determine the inclination in vertex presentations, may also render those of the face irregular; and here, likewise, we may invoke the uterine obliquities, the partial obliquity of the child, or an incomplete or an exaggerated extension of its head, to explain how we sometimes find one of the cheeks, and at others, the forehead or the chin, at the centre of the upper strait.

But still, these are not to be considered as distinct presentations, but rather as varieties or shades of the face presentation, which scarcely ever render the labour more difficult. In fact, the following is the only modification they are likely to cause in the mechanism of parturition; in the malar positions of Baudelocque, or those inclined towards the side, where one cheek is at the centre, the head undergoes a movement of correction similar to what it does in the parietal inclinations of the vertex, whereby the face gradually regains its normal horizontal direction; and, in the so-called presentations of the forehead or chin, the most elevated part becomes depressed, and ultimately gains the same level as the other.

§ 5. PROGNOSIS.

It has for a long time been considered, and still is, by some persons, that a delivery by the face cannot take place by the powers of nature alone, and it is only since the labors of Boér, of Chevreul, and of Madame Lachapelle, that an expulsion of the child in the

face positions has been admitted as being spontaneous nearly as often as it is in the vertex positions.

Nevertheless, we must be permitted to remark that, as a general rule, the labour is more tedious, more painful, and more disastrous, both to the mother and the child, and that it much oftener demands the intervention of art. Besides, the reflections above presented would naturally lead us to anticipate that the mento-posterior positions are much more unfavorable than the anterior ones. Now this unusual delay is not because the head's greatest diameters then present to those of the pelvis, as Gardien, Capuron, &c., supposed—for it is only necessary to bear in mind the relations before indicated, to understand that it is the mento-bregmatic, and the bi-temporal diameters (the one three inches, and the other three inches and three-quarters in length), which are then found to correspond with the diameters of the straits; but because the dilatation of the os uteri takes place more slowly, and because the expulsive forces, especially in the process of flexion and of disengagement, act, like the arm of a lever, very nearly at a right angle. Moreover, it has already been stated that, in all other than vertex positions, a very large quantity of the amniotic liquid usually existed between the presenting part and the inferior segment of the uterus. We have also remarked (*vide the Physiological Phenomena of Labour*), that this circumstance singularly influenced the rapidity of the dilatation of the os uteri. On the other hand, it is also evident that, when the chin is actually engaged under the symphysis, and the process of flexion has already commenced, the force of the contraction transmitted through the spine can only determine the successive disengagement of the forehead, the bregma, and the occiput, by describing a well-marked flexure, and, consequently, thereby losing a large proportion of its force.*

Certain authors, says Gardien, have incorrectly supposed that those labours in which the child presents by the forehead are more unfavorable than those where it offers by the face; for, if attention be directed to this point, the head will then be found to present in reality by its favorable diameters; and, further, as M. Stoltz remarks, in the face positions, the forehead is already the lowest part, and, the more it descends when the head engages, the more easy will

* This phenomenon is so true, that, during the process of extension, the uterine contraction is not transmitted by the spine alone; for I believe that, in certain cases at least, the thorax, by being subjected to forcible pressure, and therefore flexed on itself, just above the head, rests by its posterior-superior part directly upon the occiput, and hence may immediately transmit the uterine force to the latter, as I believe occurred in the following case: In August, 1839, I was summoned to a grocer's wife, in *la Rue du Bac*, in whom the child presented in the left transverse mento-iliac position; the membranes had been ruptured at eight o'clock in the morning, and it was then five in the afternoon, and an application of the forceps had already been attempted. However, in about three-quarters of an hour after my arrival, the labour terminated spontaneously. The infant soon revived; but, in examining its head, I detected, near the posterior fontanelle, what appeared to be two small splinters of bone, which crepitated under the finger, and there were also evident traces of a corresponding depression on its dorsal region.

be the labour. Again, the chin presentations are less favorable than those of the forehead, because the child's head is then in the most perfect state of reversion, and, if the shoulders engage at the same time with the vertical diameter of the cranium, a wedging in must inevitably take place in the excavation. But even these, also, soon transform themselves into true face presentations.

As regards the foetus, the labour, however short, may prove very disastrous; since an apoplexy, or at least a cerebral plethora, and a disposition to convulsions, are but too often, says Madame Lachapelle, its unfortunate result. Indeed, the repeated and prolonged compression of the child's neck, a compression which occurs just at the moment when the head is clearing the cervix uteri, or the superior strait, or, still more probably, when the front of the neck is placed under the symphysis pubis, satisfactorily accounts for the difficulty in the return of the blood to the head, in these positions; consequently, a particular attention should be given to the child's distress; for a case that might be abandoned to nature, were the mother alone regarded, would require the intervention of our art, to relieve the foetus from its painful situation. In cases of this kind, where the face had descended enough to be in full view at the vulva, Madame Lachapelle was in the habit of judging by the movements of the infant's tongue and lips; though it must not be forgotten that these motions are not constant; but, when they do exist, and are found to grow weaker, and finally to disappear, they constitute a bad sign, and claim our immediate attention. Furthermore, the child often exhibits certain peculiarities in face deliveries, which ought to be known, in order that the family may be advised of them beforehand; that is, the face corresponds to the open space in the excavation, as also for a long time to the void under the pubic arch; and hence, it becomes the seat of the ecchymosis and the sero-sanguineous infiltration before spoken of, as happening in the vertex presentations. Consequently, when the accouchement has been somewhat tedious, the infant's face at birth is nearly black, its cheeks swollen, its lips turned in, and the nose scarcely visible, and nothing frightens the parents so much as such an object, if they had not been previously advised of the possibility of such an occurrence. However, this condition is generally dissipated in the course of a few days, and its resolution may be hastened by lotions composed of a little wine, or vegeto-mineral water, or brandy, freely diluted with water. No alarm need be felt about the tendency observed in the head to fall backwards, as soon as its support is withdrawn; for, it only regains the attitude it had temporarily in the pelvis; no doubt this feebleness in the muscles of the neck, owing evidently to the prolonged extension they have undergone, has momentarily paralyzed a part of their contractile force; but it ordinarily disappears in the course of two or three days.

ARTICLE IV.

PRESENTATION OF THE PELVIC EXTREMITY.

We have already had occasion to state that most accoucheurs describe three distinct presentations of the child's pelvic extremity: to wit, the presentations of the breech, of the feet, and of the knees, according as the breech, the feet, or the knees are the first to engage in the excavation and clear the external parts of generation. We have also explained why (following the example of Madame Lachapelle, Ant. Dubois, P. Dubois, and others) we only consider these three as being slight modifications of the true pelvic presentations; for modifications that do not in anywise change the mechanism of the natural labour ought certainly to be included under one and the same title.

Thus we will admit it may happen, in presentations of the pelvic extremity, that this extremity, composed of all its elements, that is to say, of the thighs flexed on the abdomen and the legs on the thighs, engages in the excavation, and passes out at the inferior strait; or that the lower extremities, carried along when the membranes are ruptured by the gush of the waters, may be completely or partially unfolded; the feet in the former case, and the knees in the latter, appearing first at the exterior; or that, the inferior members being stretched out and drawn up along the child's anterior plane, the breech alone may descend;* or, lastly, that one of the lower limbs may be extended up along the abdomen while the other is drawn down, and then one foot or one knee, as the case may be, will present at the vulva. But we shall include all these varieties under the general name of the *presentation of the pelvic extremity*; and we again repeat that, in the presentations of this extremity, the points of departure, taken on the foetus, are: the posterior face of the sacrum for the breech; the anterior face of the tibias for the knees; and the heels in the footling cases; and, with regard to the pelvis, the sacrum or the child's back may be found in relation with any one of the various parts of its superior strait; but still, all these shades of position are included in two principal ones: namely, a first, or left sacro-iliac, and a second, or right sacro-iliac position; and, further, each of these exhibits its anterior, transverse, and posterior varieties.

The presentations of the pelvic extremity are less frequent than those of the vertex, though much more common than those of the

* This position of the lower extremities may be primitive; that is, it may exist before the rupture of the membranes (indeed, according to M. P. Dubois, this most frequently occurs), or may be consecutive to the breech's engagement. In this latter case, the feet may have been arrested either by the periphery of the cervix uteri, or by the superior strait at the time when the breech was passing into the excavation, and hence the inferior members would be forcibly pressed up along the child's anterior plane.

face. Thus, in thirty-seven thousand eight hundred and ninety-five labours, Madame Lachapelle has noted one thousand three hundred and ninety of this class; in twenty thousand five hundred and seventeen, Madame Boivin observed six hundred and eleven; and in two thousand and twenty, M. P. Dubois met with eighty-five such instances; and, in order to give an idea of the relative frequency of the different cases in which the nates, the knees, or the feet are the first expelled, we will add that, in those eighty-five labours, the nates primarily appeared at the vulva fifty-four times, and the feet twenty-six times. The presentation of the knees, so called, was not observed in a single instance. In fact, this is a very uncommon variety; for, in the thirty-seven thousand eight hundred and ninety-five cases of Madame Lachapelle, the knees only came down first eleven times, or one in three thousand four hundred and forty-five.

In a sum total of sixteen thousand six hundred and fifty-four accouchements, Dr. Collins has observed the pelvic extremity to offer once in thirty times; and Ramsbotham, Jr., from calculations founded on twenty-seven thousand seven hundred and thirty-nine labours, and twenty-eight thousand and forty-three births, occurring at the Maternity of London, has arrived at the conclusion that breech presentations are to the others as one to thirty-five.* Again, the left sacro-iliac positions are far more frequent than the right; thus, in thirteen hundred and ninety instances, the back looked towards the left side seven hundred and fifty-six times, and to the right, four hundred and ninety-four times; but thirteen in front, and only twenty-six directly backwards (Lachapelle). And in the eighty-five positions of M. P. Dubois, the back was forty-one times towards the mother's left, and forty-four to her right. As to the varieties exhibited by these two positions, the left anterior is a little more frequent than the right posterior one, but each of them is far more common than all the others put together. For instance, in one hundred and sixty-three pelvic presentations, says M. Nægèle, the back was in front and to the left one hundred and twenty-one times, whilst it was only forty times behind and to the right.

§ 1. CAUSES.

It is wholly impossible, in the present state of our science, to say why the breech should sometimes present at the superior strait; true, numerous explanations have been offered, and the following, proposed by Madame Lachapelle and reiterated by Velpeau, is perhaps the least objectionable of any. The child, they say, floats comparatively free in the uterus, until near the eighth month; then its head, during certain movements on the part of the mother, lying down in particular, is carried towards the fundus uteri; and, if the infant has then acquired a considerable volume, perhaps its great

* By a table in the revised edition, Dr. Ramsbotham furnishes a record of 35,743 deliveries that occurred between January 1st, 1828, and December 31st, 1843, in which there were 930 presentations of the breech, or lower extremities, thus showing the proportion to be 2.6 per cent., or 1 in 38.8.—*Translator.*

occipito-coccygeal diameter cannot repass through the small diameters of the uterine ovoid, without undergoing as forcible a movement as that which changed its position; and if this latter does not occur the foetus will retain its new attitude, and at the time of the labour the pelvic extremity will present at the passage. This explanation, I repeat, although liable to many objections, still appears the most probable.

§ 2. DIAGNOSIS.

Even before the commencement of the labour, a breech presentation may be almost positively diagnosticated by the following signs: namely, in thin women, whose abdomens, from being previously distended by numerous pregnancies, retain a certain degree of softness and flaccidity (and the womb only containing then a moderate quantity of liquid), we may more or less readily detect the head occupying the upper part of the matrix, and inclined towards one or the other side, but no part can be made out by the internal exploration, since the hard, rounded tumor felt in the vertex presentations is always absent. Sometimes, as has often happened to myself, a little tumor (the foot) can be detected and *balloted*; and, further, the heart's movements are revealed by auscultation at a high part of the abdomen, on a level with, or possibly above, the umbilicus.

The bag of waters is very large during labour; it sometimes engages quite early in the vagina, resembling a blood-pudding in form.* When the membranes are ruptured, a very considerable quantity of water escapes, for the presenting part fills up the neck but very imperfectly, and hence, all the amniotic liquid flows out; and if the rupture should occur during a strong pain, it would probably be accompanied by a loud report.

Stein described the uterine orifice as being oval after the rupture, and Madame Lachapelle confirmed this sign; but I must confess that I have found great difficulty in verifying it.

A momentary suspension or a diminution of the pains often results from a too copious or a too rapid discharge of the waters; and, further, a flow of meconium most generally takes place soon after the membranes give way.†

* Certain writers have evidently been in error in giving this particular form of the amniotic sac as a positive sign of a presentation of the pelvic extremity, since it may be met with in other cases. I have twice observed it myself in clear vertex presentations that were engaged, even then, as far as the middle of the excavation. I can only explain this last circumstance by supposing an excessive laxity in the membranes.

† However, a discharge of meconium may take place in other than pelvic presentations; but then it is an alarming sign, and one that should receive the accoucheur's immediate attention. In fact, it always indicates the death, or at least the suffering condition, of the child; and, therefore, will most generally require the intervention of art, since it is particularly apt to come on when the labour has continued a long time after the rupture, and the foetus is suffering from this protracted delay; or possibly it may announce the compression of the umbilical cord (*vide Prolapsus of the Cord*). Nevertheless, it is highly important to ascertain the time when the meconium escapes; for, when the membranes are ruptured, the amniotic liquid is sometimes found tinged with a

But the only characteristic signs are those furnished by the touch; and they will vary with the presenting part. Therefore, although we have confounded, so far as the mechanism is concerned, all the cases in which either the nates, the feet, or the knees present, under one general term; yet, in the diagnosis, we must carefully distinguish them from each other; thus, for instance, when the breech alone presents, the finger first encounters a soft, rounded tumor, upon some portion of whose anterior surface a hard, resistant part, formed by the great trochanter of the thigh bone, is detected. Thus far it might be mistaken for a vertex presentation, but if the finger be next carried upwards and backwards, so as to reach, as it were, the sagittal suture, it will penetrate into the fissure between the nates, at the bottom of which the most important diagnostic signs are discovered; for the point of the coccyx is felt towards one side, surmounted by an irregular osseous surface, that is constituted by the posterior face of the sacrum; then the anus, a small, rounded, and wrinkled orifice, into which the finger cannot be introduced without resorting to a considerable force, whatever authors may say to the contrary; and, lastly, the external genital organs can be easily distinguished, and thereby the sex of the child may be announced in advance.*

The prominence of the coccyx is not only a certain sign of the presentation, but it may also serve in recognizing the position; because its point is always directed towards the side not corresponding with the child's back.

2. Where the two feet present together in the vagina, it is impossible to confound them with any other part, and the direction of the heels then clearly indicates the child's position. But where a single foot only is detected, and that very high up, it might be mistaken for a hand. However, a little attention will serve to distinguish them; thus the toes are arranged in the same line, are

considerable quantity of this substance, and yet the foetus is doing well, but then this mixture occurred at some distant period of the gestation; for it is possible, that the cord may be momentarily compressed during the latter months of pregnancy, and that any sudden movement of the child may displace it, and thus re-establish the foeto-placental circulation, and yet this compression has existed long enough to give rise to a threatened asphyxia, and, consequently, to an escape of meconium.

An effort has been made to determine, by the physical characters of this fluid, whether its discharge had been produced by a breech presentation, or by a state of suffering in the child itself. In the latter case, it was stated that the meconium was very fetid, and less consistent, though more diluted and more mixed than when the nates are above the uterine orifice. But all such signs are of very little value.

* But the accoucheur ought to be exceedingly careful not to deceive himself on this point; and, in case of any doubt, it would be much better to abstain from all predictions, than to expose himself to an error that would most certainly be retorted upon him afterwards. It is also prudent, where the child is ascertained, by the touch, to be of a sex different from what the family, and more especially from what the mother desires, not to communicate the result of his diagnosis, lest the disappointment she would experience might, like any other acute moral emotion, exercise an unfavorable influence over the progress of her labour.

shorter and less movable; while the fingers are longer and the thumb is separated from the others; the foot's internal border is much thicker than the external; but the two margins of the hand are very nearly of the same thickness; again, the foot articulates with the leg at a right angle, while the hand continues out the line of the arm.

The diagnosis is more difficult when the feet present along with the nates, and they alone are accessible. Sometimes even only one foot can be felt, which renders the case still more obscure; and, in such an instance, we have first to ascertain which is the foot touched; though, for that purpose, it is only necessary to pay attention to the relation existing between its internal border and the heel. For instance, let us suppose that the latter is turned towards the symphysis pubis, and its internal border to the mother's right side; this is evidently the right foot; if, on the contrary, the heel be directed towards the sacro-vertebral angle, and the internal border to the right, this would be the left foot, &c.; and the right foot being once distinguished from the left, it only remains to determine towards what part of the superior strait the points of the toes are directed (bearing in mind that we always suppose the inferior extremities are flexed on the abdomen, and the feet are crossed). In this position of the child, if the toes of the right foot are turned towards any point on the pelvis' anterior moiety, the infant's back will be directed to some part of the left lateral moiety; but if the toes on the left foot point towards the anterior half of the pelvis, the child's back will look to some point on the right lateral half, and *vice versa*.

3. The knees very rarely present first; besides, they have such well-marked characteristics in their form, their roundness, their hardness, the size of the limbs attached, and the fold of the ham which surmounts them, a fold presenting a transverse concavity instead of the convexity exhibited at the elbow and instep, that we consider it useless to dilate further upon their diagnosis.

§ 3. MECHANISM.

As the left anterior, and the right posterior, are the most frequent of the three varieties admitted for both the left and the right sacroiliac positions, we shall select them as the type of our description.

1. *Mechanism of Natural Labour in the left anterior sacroiliac position.* (The first, of authors.)

Before the rupture of the membranes, all the child's parts are folded up along its anterior plane; that is, the head is slightly flexed on the chest, the arms are applied to the sides of the thorax, the forearms are bent on the breast, and the inferior members are flexed on the front of the abdomen. In the position before us, the foetus' back looks forward and to the mother's left; its anterior plane behind and to her right; its left side is in front and to the right, and the right side behind and towards the left; the great or bis-iliac diameter of its hips corresponds to the right oblique, and its sacro-pubic or antero-posterior one to the left oblique diameter.

Prior to the rupture, the presenting part is very high up; but, at

the moment of its occurrence, a large quantity of the waters escapes; and this part then becomes more easily accessible. Then, also, the presentation becomes fixed, and one of the divers varieties before studied is thereby established.

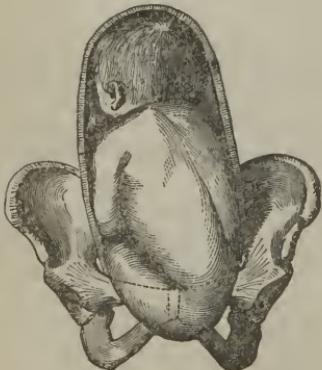
Fig. 60.



The presentation of the breech in the left anterior sacro-iliac position.

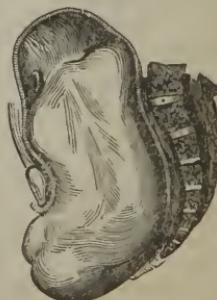
turator internus muscle, and that are situated in the left posterior quarter of the basin. Having arrived at the inferior strait, the child's pelvis undergoes a movement of rotation that carries the left hip behind the right ischiopubic ramus, and the right hip in front of the internal moiety of the sacro-sciatic ligament. The left or anterior hip next engages under the aforesaid ramus, and is the first to show itself through the vulva at the exterior; but it is generally the right or posterior hip, which, advancing step by step, and describing an arc of a circle around the

Fig. 61.



The same position after the internal rotation is accomplished.

Fig. 62.



The delivery of the breech.

anterior one as a centre, and traversing the whole internal surface of the perineum, first succeeds in disengaging itself at the anterior

perineal commissure, while the other remains nearly immovable at the summit of the arch. During the delivery of the breech, the child's trunk, by becoming strongly engaged in the excavation, is flexed laterally on its anterior (left) side in such a way as to accommodate itself to the curvature of the pelvis. Again, as the right buttock approaches the posterior commissure of the labia externa, and engages in this opening, the breech, or rather the bis-iliac line of the foetus, which had already cleared the lower strait in a somewhat diagonal position, now assumes an exactly antero-posterior direction, so as to correspond with that of the longitudinal diameter of the vulva. However, this is not constant, as the breech sometimes retains its diagonal character throughout; the thighs closely applied on the belly already begin to appear, and, pending the disengagement, the foetal trunk, by accommodating itself, as above stated, to the direction of the pelvic axis, is strongly flexed on its anterior (left) side. The rotation executed by the hips, when they reach the inferior strait, may either be a partial movement, or else one in which the whole trunk participates.

In the former case, it can only take place by the aid of a certain degree of torsion in the lumbar vertebral column, and then the pelvis, immediately after its delivery, undergoes the process of restitution, whereby it once more regains its primitive diagonal position.

As soon as the hips are clear, the breast engages in the excavation (the arms always remaining applied on the anterior-lateral parts of the thorax), and the shoulders soon arrive at the inferior strait in an oblique position, supposing they have not previously participated in the rotation performed by the child's pelvis.

The shoulders observe the same mechanism in disengaging as the hips; that is, they turn in such a manner as to place the anterior one, here the left, behind the right ischio-pubic ramus, and the posterior one just in advance of the left sacro-sciatic ligament, whence they both clear this strait diagonally; but when this is passed, and there is no other resistance than that of the soft parts to overcome, they complete the rotation and become placed; the one, directly in front; the other, behind. As to the other parts, the sub-pubic shoulder and elbow primarily appear at the exterior; but it is still the posterior ones that are first delivered.*

Prof. Dubois contends that, in breech deliveries, the anterior hip and the front shoulder, in the disengagement of the trunk's upper

* Many books, on the subject of shoulder-delivery, assert that the arms are retained by the borders of the excavation, and therefore they get up alongside of the head; though, as Desormeaux very justly remarked, this scarcely ever happens when the accouchement is left entirely to nature, and no traction whatever is made on the pelvic extremity; consequently, when the labour progresses regularly, the accoucheur should overcome the temptation to aid nature a little by drawing on the parts, for such imprudent traction must certainly straighten out the arms, since there is no counteracting power in these cases to press them outwardly; for, being retained by the friction, they remain above the excavation, and the head descends between them, rather than that they mount up on its lateral parts: and fortunate indeed will it be if an extension of the head is not produced by these tractions!

portion, are expelled before the corresponding part in the rear ; but I may be permitted to repeat again, that, although matters often do occur in the way described by the professor, still, it has seemed to me that the view above given holds true in the majority of cases. Whilst the shoulders are traversing the pelvis, in the manner just indicated, the head, being flexed on the breast, clears the upper strait in the direction of its left oblique diameter; that is, the forehead is turned towards the right sacro-iliac symphysis, and it retains that position until it reaches the inferior strait.

The head's diameters, which are then found in relation with those of the perineal strait, will necessarily vary according to the greater or less degree of the flexion of the head. For instance, when it is only moderately flexed, which is generally the case, the occipito-frontal diameter corresponds to the left oblique one, the bi-parietal to the right oblique, and the axis of the inferior strait traverses the head very nearly in the direction of its trachelo-bregmatic diameter.

If we suppose the head to be more powerfully flexed on the chest, the sub-occipito-bregmatic diameter takes the place of the occipito-frontal, and the occipito-mental corresponds very nearly to the strait's axis. In a word, we find the same relations as in a vertex presentation, only the head presents by its base instead of its summit.

It then performs a movement of rotation, whereby the face is carried into the hollow of the sacrum, while the occiput gets *behind* and the neck *under* the symphysis pubis ; whence the sub-occipito-bregmatic diameter approaches the antero-posterior one very closely, but it still retains, however, a certain obliquity. At that time, the womb can act but very feebly on the head (*vide Prognosis*), which is altogether down in the vagina, or nearly so ; but the tenesmus, says Velpeau, occasioned by its pressure on the rectum and the bladder, constrain the woman to gather up all her forces, and to redouble her courage, and then the contractions of the abdominal muscles soon come to the aid of the enfeebled matrix ; these powers, acting conjointly, flex the head more and more, and, whilst this process of flexion is going on around the neck or the sub-occipital region as a centre, the chin, the forehead, the bregma, and occiput will be found to appear successively in front of the anterior perineal commissure.

During the flexion, the head represents a lever of the first kind, whose power is at the occiput, the fulcrum at the sub-occipital point, or that portion of the neck situated under the arch, and the resistance at the chin, or rather at the forehead, which, being arrested by the perineum, must distend the latter and render it thinner. Hence, if radii be drawn from the sub-occipital point of the head, located under the symphysis, as a centre, and terminating at the median line of the face and vault, those radii will exactly represent the diameters which successively clear the antero-posterior one of the inferior strait ; the principal of which are the sub-occipito-mental, the sub-occipito-frontal, and the sub-occipito-bregmatic.

2. *Mechanism of Natural Labour in the right posterior sacro-iliac position.* (Fourth of Baudelocque and third of Capuron.)—In this

position, the child's sacrum is turned towards the right sacro-iliac symphysis, its back is behind and to the mother's right, and its anterior plane is to the left, in front; the right side looks forward and to the mother's right, while the left side is behind and towards her left; and the great or bis-iliac diameter of the child's pelvis corresponds to the right oblique diameter.

Let us suppose, when the membranes are ruptured, that the lower extremities, swept along by the gush of liquid, are completely unfolded, and that the feet present first at the vulva. In this case, the limbs are soon delivered, under the influence of the uterine contractions, without offering any peculiarity, and the hips easily reach the inferior strait, where they engage, sometimes preserving their primitive diagonal position, while at others the anterior one gets slightly in advance towards the symphysis pubis, and the other or posterior goes behind to the median line of the sacrum.

The arms and shoulders present in turn, and their disengagement is nearly the same as in the preceding case.

After the delivery of the shoulders, the head alone remains in the excavation, and its expulsion may take place in several different ways; sometimes, indeed, the occiput remains posteriorly throughout the whole delivery, though at others, and indeed in the great majority of cases, it comes round in front so as to place itself behind the symphysis pubis.

A. *The Occiput comes in front.*—This conversion may begin as soon as the hips are clear at the perineal strait; thus, it often happens, as before stated, that the whole foetal trunk participates in the rotation of the haunches, whence the child's posterior plane, which was primitively situated behind, is brought in front by describing a kind of a spiral, that commences in the hips and terminates at the occiput. The head also has participated in the trunk's rotation, so that, when the former descends into the excavation, the occiput becomes placed behind the symphysis pubis.

But when the occiput is still posteriorly, after the delivery of the trunk, this transmutation of the head may even take place in the pelvis or at the perineal strait. In such cases, after the shoulders are born, the child's back again returns posteriorly by a sort of restitution, and the head, remaining alone in the excavation, becomes placed in the direction of the left oblique diameter, the occiput being behind and to the right, and the forehead or bregma towards the mother's left, in front; it then performs a movement of rotation, by which the occiput, after having traversed the whole right lateral moiety from behind forwards, locates itself behind the symphysis, and the forehead, by rolling from front to rear, is carried into the hollow of the sacrum. Though, whatever may have been the mode by which this mutation is effected, the labour terminates, just as in the preceding case, as soon as the occiput gets behind the pubic symphysis.

B. *The Occiput remains behind.*—When this phenomenon persists until the end of labour, the head's disengagement may take place in two ways; thus, in the majority of cases, this part engages in the

excavation in a state of flexion, where it soon undergoes a very slight movement of rotation, which carries the occiput towards the concavity of the sacrum, and the forehead or bregma behind the symphysis pubis; then, as the uterine contractions and the abdominal muscles force the head to become more and more flexed, the following parts are found to appear in succession below the symphysis and traverse the vulva: first the whole face, then the forehead, the bregma, the vertex, and last of all the occiput. The head is therefore delivered by a process of flexion, having the neck, as a centre, resting against the anterior perineal commissure.

Fig. 63.



Delivery of the head in the sacro-posterior positions.

scribed for the left anterior one; and, again, the mechanism of the left posterior is an exact counterpart of that of the right posterior sacro-iliac position.

§ 4. PROGNOSIS.

The accouchement by the pelvic extremity is much more unfavorable than that which takes place by the cephalic; and therefore we have to examine it, both as it regards the mother and the child.

1. *As regards the Mother.*—In general, the labour is somewhat longer where the foetus presents by the breech, for the size of the parts that constitute the pelvic extremity, it has been said, do not permit it to engage so readily; and hence the uterine contractions must operate a longer time in order to adapt those parts to the diameter of the pelvis. This is true; but, as Madame Lachapelle has observed, their softness is such that, when once engaged, they easily conform to the passage; and besides, as M. P. Dubois declares, the greater their volume is, the more will the labour resemble that of the vertex presentations. Consequently, the professor teaches, contrary to the opinion generally adopted, that a delivery by the

breech is far preferable to the one where the feet come down first; the truth of which proposition will be better understood when we shall have pointed out the inconveniences attending this latter circumstance.

As the footling presentation does not exhibit the same unfavorable appearances in respect to volume, it is preferred by some persons; for then the fetus, presenting by its smallest extremity, will, in their estimation, be more easily expelled, since the dilatation of the parts, from being slow and gradual, will be much shorter and less painful. If you wish, they say, to drive a cork into the neck of a bottle, you would present its smallest extremity, and then it would enter more readily, and the same is true of the child in the foot presentations; for the foetal ovoid may be considered as a cone, whose base is at the cephalic, and whose summit is at the pelvic, extremity. In the case of the bottle this is true, but only so, because the efforts you use to make it penetrate will be redoubled as the larger extremity approaches the neck of the bottle; that is, the force will increase with the difficulties to be overcome; but this last condition does not hold good in the delivery by the feet. Because, as the child's inferior parts become successively disengaged, there is less left remaining in the uterine cavity, and there is even a period when the head, having reached the excavation, is almost entirely out of the cavity of its cervix; but the uterus, during its evacuation, retracts, and, like all contractile muscles, it loses a great portion of its power by this retraction; and it is therefore just at the moment when the great extremity of the cone, represented by the fetus, has to overcome the resistance of the soft parts, that the uterine contractions are the most enfeebled, and often, indeed, they cannot aid at all in the expulsion of the foetal head; consequently, the powers here diminish in an inverse ratio to the obstacles in the delivery. If the reader now recalls what takes place in vertex presentations, he will readily comprehend the difference between the two; no doubt, the child's largest part then presents the first; but remark that, up to the moment when the head clears the vulva, the uterus yet contains in its cavity a considerable quantity of amniotic liquid, and also the largest part of the foetal trunk; wherefore, it is still sufficiently distended not to have lost its power of contracting, a power that can be exercised over a large surface, and upon which it is forcibly applied until the end of labour. Again, the head having once reached the exterior, the parts which have been freely dilated by its passage only offer a feeble resistance to the expulsion of the trunk and lower extremities; and hence, the womb's retraction may diminish its expulsive forces without this diminution having any unfavorable influence over the termination of the labour. We know further that, when the breech presents, the dilatation takes place more slowly, especially if the rupture of the membranes has occurred a long time before the os uteri was much opened; for the elevation of the presenting part prior to the discharge of the waters, and its irregular shape, which prevents its ready engagement, sufficiently explain the slowness then manifested in the dilatation of the orifice.

2. *As regards the Child.*—The delivery by the pelvic extremity is very unfavorable; thus, the statistical results furnished by Madame Lachapelle prove that, in eight hundred and four presentations of this class, one hundred and two children are born feeble, and one hundred and fifteen are stillborn; the proportion of deaths to the whole being rather more than one-seventh; whilst, in twenty thousand six hundred and ninety-eight vertex positions, there were only six hundred and sixty-eight stillborn children, which gives one in thirty, or about one-thirtieth. As to the particular prognosis in each of the three varieties of this presentation, it has been remarked that, when the buttocks advance first, the number of deaths is about one in eight and a half, or a little less than an eighth; for footling presentations, one in six and a half, rather less than one-sixth; and for the knees, one in four and a half, or not quite one-fourth. But M. P. Dubois has justly remarked that this proportion is not perfectly correct, since all the children born by the pelvic extremity are included in the registers of the Maternity, without making any allowance for circumstances foreign to the position, but which nevertheless may have produced the child's death. Therefore, by laying aside all the cases where the children seemed to have been lost under the influence of causes that evidently did not attach to the presentation itself, he has arrived at the conclusion that, in delivery by the pelvic extremity, about one child in eleven dies; whilst, in vertex presentations, there is only one in every fifty. The difference still, as here shown, is frightful.

Other things being equal, the accouchement is much more dangerous for the foetus in primiparae, than in those who have previously borne children; because the resistance of the perineum, which is sometimes sufficient in the former to arrest the labour, even in vertex presentations, is here so much the more powerful towards stopping the head as the uterine contractions are the weaker, as just demonstrated.

But what is the cause of the child's death? For a long time it was supposed that, when the foetus presented its smallest extremity, each part, as it came down, being more voluminous than the one which preceded it, had to overcome new resistances; that it underwent, in consequence, a certain amount of compression, and this compression, being exercised from below upwards, would necessarily produce a stasis in the infant's circulation, and thus give rise to a cerebral congestion, the anatomical signs of which are detected at the autopsy of the little corpse. But this supposed blocking up of the vessels is altogether inadmissible: 1st, because the uterine neck is alternately in a state of relaxation and constriction, though such an explanation would require it to be permanently contracted; 2d. Because, however great the contraction, it would not be sufficient to compress the large vessels situated deep in the extremities, and in the centre of the great cavities; 3d. Besides, by recalling what takes place in the vertex and face presentations, we shall see that it is not in the parts which are still contained in, and compressed by, the uterine cavity, that a more considerable afflux of fluid would be likely

to occur, but rather in those which, from being already free, are thereby relieved from all further compression. We think this mortal congestion can be explained in a much more satisfactory manner by a compression of the cord; for, after the breech is disengaged, the cord is stretched from the umbilicus to its placental insertion, and is found, both in the excavation and uterine cavity, between the pelvic wall and the trunk, or even, a little later, betwixt this wall and the child's head. Hence, we can easily understand how great is its liability to be compressed, and how the delivery of the upper parts, and more especially of the head, often takes place with difficulty; how this pressure may exist for a long time, and thus necessarily interrupt the circulation in the cord. Indeed, it is now generally admitted that the placenta is the seat of the child's respiration; or, rather, that the blood of the foetus comes there directly into contact with the mother's, whereby it experiences certain modifications closely analogous to that which the blood of the adult undergoes in the lungs, by its contact with the atmospheric air; the circulation being interrupted in the cord, the foetus then finds itself in the condition of an adult deprived of respirable air, and it dies asphyxiated; for it is well known that cerebral congestion is one of the most constant anatomical phenomena of this state.* I am of the opinion that asphyxia of the foetus might take place in still another manner, and yet without the cord being necessarily compressed. It was stated above, that, when the head gets down into the excavation, no portion of the child is left in the uterine cavity, and the empty womb then retracts of its own accord; which retraction determines, as is well known, the placenta's separation, whereby the utero-placental vessels are inevitably torn, and the foetus is then found in the same condition as if the cord was compressed, and, should the expulsion of the head be at all delayed, it might die asphyxiated.

* Most of the older writers have explained the child's death somewhat differently, in these cases; thus, according to some, the pressure interrupts the circulation in the umbilical arteries, but leaves the calibre of the veins entirely free, whence the foetus continues to receive blood through the latter, without being able to send it back again by the former; and it then dies from a superabundance of this fluid, from apoplexy. Others, on the contrary, supposed that the structure acted more particularly upon the vein, leaving the arteries free, and therefore the infant died of anemia or syncope. Neither of these theories will bear the slightest examination, since it is all-sufficient to examine the cord, and the intertwining of its vessels, to be convinced that this partial compression cannot exist, except under peculiar circumstances; that such pressure must interrupt the circulation, both in the arteries and veins, and that it neither augments nor diminishes the quantity of the child's blood. Death by asphyxia, therefore, is the only possible mode.

ARTICLE V.

PRESENTATION OF THE TRUNK.

At the commencement of this chapter we gave the reasons that induced us, like Madame Lachapelle, Nægèle, and Dubois, to admit but two presentations for the trunk, and therefore shall not now repeat them; for, doubtless, the reader will bear in mind that all the varieties of the trunk presentations may be referred to the two following; namely, one of the right and one of the left lateral plane.

When the former presents at the superior strait, the child's head, which, in these cases, is taken as the point of recognition, may be found placed over some portion of the pelvis' left lateral moiety, and this constitutes the first position of the right lateral plane (or of the right shoulder, Lachapelle); or, the head may be located over some point on the right lateral moiety, and this is the second position. We have, therefore, two positions of the right shoulder, or right lateral plane; and, in the same way, there are two for the left shoulder, or left lateral plane; in the one, the head is to the mother's left (the left cephalo-iliac), and in the other it is at her right (the right cephalo-iliac).

It is a very common circumstance in trunk presentations to find the arm and hand hanging down in the vagina, or even the latter may appear at the vulva; but this, although regarded for a long while as a much more serious affair than a proper shoulder presentation, is only to be considered as an attendant effect, very nearly similar in its character to the deflection of the lower extremities in certain labours by the pelvic extremity; and the older accoucheurs have therefore erred in describing it as a distinct variety, under the title of the presentation of the arm and hand, as it is merely an additional phenomenon associated with the presentation of the child's lateral region, which scarcely merited consideration as a variety of these positions; and we shall see, further on, wherein they were mistaken on this point of doctrine.

The trunk presentations are comparatively rare, being a little less so, however, than those of the face; thus, Madame Lachapelle met with sixty-eight cases in fifteen thousand six hundred and fifty-two labours, or one in about two hundred and thirty; and, in the two thousand and twenty accouchements reported by M. P. Dubois, there were thirteen trunk presentations. Doctor Bland observed it in the proportion of one to two hundred and ten; Dr. Joseph Clarke, one in two hundred and twelve; Merriman, one in one hundred and fifty-five, in his private practice; M. Nægèle, one in one hundred and eighty; and Dr. Collins, one in four hundred and sixteen.

As to the relative frequency of the presentations and positions, it would appear, from the statistical tables of Madame Lachapelle, that the right shoulder, or the right lateral plane, presents a little more frequently than the left; and that the dorso-anterior positions, that

is, the first one of the right shoulder, and the second of the left, in which the back corresponds to the anterior part of the uterus, are more frequent than the dorso-posterior positions, or the first one of the left and the second one of the right shoulder, where the child's back is directed towards the mother's loins. (*Nægèle*.)

§ 1. CAUSES.

We have but little to say concerning the cause of trunk presentations, excepting that the smallness and mobility of the child, or a considerable accumulation of amniotic liquid by which the organ is rounded in its form, the uterine obliquities, the obliquity in the pelvic straits, and the vices of conformation at the superior strait are generally referred to as the predisposing causes. As to the determining causes, the only ones recognizable are fortuitous and accidental; thus, any violent commotion, or any trifling shocks, kept up for a long time, such as those produced by carriage riding, or by exercise on horseback, the perturbation from the upsetting of a coach, and even any sudden fright may change, according to the authors, the child's position in certain cases, thereby spontaneously converting a vertex presentation into one of the shoulder. Indeed, many accoucheurs have supposed that irregular or partial contractions might convert, during labour, a favorable position into one of the trunk; this is barely possible, though it is hardly probable. But I cannot as readily admit the supposed influence which, according to some others, those uterine contractions may have, that torment the woman during the last few days, or sometimes even weeks of her gestation, and which have before been considered as the preludes of labour. The following is a case in point: A patient, in whom the fœtus presented by the shoulder five times successively, had always suffered from pains of that nature during the last few days of her pregnancies; Professor Nægèle, under whose care she came in her sixth, endeavored this time to calm those dolors which again appeared with the same energy as in the preceding gestations; and, after the ineffectual administration of various remedies, he finally ordered opiate injections, when, to his great satisfaction, the spasms ceased almost immediately, and were not again renewed, and the woman was delivered at full term of a living child, which presented in a favorable position. But what does this prove? simply that, whatever may be the child's position, these pains, the preludes to labour, may occasionally manifest themselves, and that vicious positions may be reproduced in the same woman with a most deplorable perseverance; for it must be evident that such contractions are too feeble to change the child's position in any way, and more especially when we remember that the integrity of the amniotic sac, and the presence of the waters, likewise protect it from any influence they might have.

§ 2. DIAGNOSIS.

There is sometimes reason to suspect a trunk presentation, even before the commencement of the labour, by the following signs; the

woman's belly is much larger in its transverse diameter than usual, and, in those whose tissues are soft and flabby, the abdominal parietes can often be depressed enough to detect the foetal head in one of the iliac fossæ, presenting there as a hard, rounded, and resistant tumor; then, by placing the hands opposite each other in the lumbar regions, a greater and more firm resistance offered by the two extremities of the foetal ovoid will be felt at these points, and the solid body, formed by the child, may be readily moved from side to side, thus proving that its long axis lies transversely above the superior strait; besides, the tumor formed by the head, in the vertex presentations, is no longer detected by the vaginal touch, since it is almost impossible to reach the presenting part; in some rare instances, the elbow, or the little hand of the child, may be recognized and balloted, and this sign, accompanied by the first two, renders the diagnosis quite probable.

But we do not believe, although it has been asserted of latter time, that auscultation can throw any light on the diagnosis (*vide page 128*). Before the membranes are ruptured, the elevation of the part renders the vaginal touch very difficult; and so, of course, the form of the bag of waters, or that of the uterine orifice, can be of but little service here. According to Madame Boivin, the os uteri dilates more slowly, but as this slowness of dilatation is met with in all presentations, excepting those of the vertex, it forms a sign of minor importance; the touch, therefore, can only give a positive certainty after the rupture of the membranes. When the side is the presenting part, the shoulder (Lachapelle) is very frequently found at the centre of the superior strait, as also the elbow, or the side of the chest (P. Dubois), and hence will be the first encountered by the finger in making an examination; and we therefore have to point out the characters, successively, by means of which these several parts may be recognized.

1. When the shoulder presents, the finger first detects the rounded tumor formed by its summit, upon the surface of which a small osseous projection, constituted by the acromion, is distinguished; then, behind or in front, according to the position, the clavicle and the spine of the scapula are felt, and below the clavicle the intercostal spaces are easily made out, whilst under the spine of the scapula there is only a plane surface, terminated by the acute inferior angle of this bone, which is movable and permits the finger to slip under it; lastly, on the sides of the tumor formed by the shoulder, the axillary space can always be distinguished, and sometimes also (though on the opposite side) the depression in the neck can be felt.

The shoulder being once recognized, we must next determine which one it is, and what is its position. I will remark, in advance, that we have admitted but four positions of the trunk, namely, two for the right shoulder and two for the left, and that the relation existing between the situation of the head and that of the child's posterior plane is different in each of these four: thus, there are two positions where the head is to the left, namely, the first position of the right and the first of the left shoulder, and remark that, in the latter,

the child's back is turned towards the mother's loins, in the former, on the contrary, it is in front, and therefore, whenever the head is to the left and the child's back is behind, we have to treat with a first position of the left shoulder.

In the same way, there are two positions in which the head is to the right, to wit, the second of the right and the second of the left shoulder; but again observe, that in the latter the back looks forwards, while in the former, on the contrary, it is directed posteriorly. Hence, to recognize a second position of the left shoulder, it will only be necessary to ascertain that the child's head is turned towards the mother's right side, and its back looks anteriorly. In a word, to satisfy ourselves which is the presenting shoulder and what is its position, we only have to find out where the head lies, and where the child's posterior plane is.

The shoulder presenting and being recognized, it is evident that if the axillary space looks towards the mother's right, the head will be to her left, and *vice versa*; consequently, the head's locality is readily known by the direction of this space, and, as regards the child's dorsal plane, the omoplate will clearly indicate its position.

2. When the elbow alone is accessible to the finger, it may be recognized by the three osseous projections (the olecranon and the two condyles), which it presents by the transverse concavity in the bend of the elbow, and by the vicinity of the chest and intercostal spaces. The elbow having been distinguished, it will be necessary to make out the position to ascertain where the foetal head and its dorsal plane lie, but this is now comparatively easy, since the elbow is always directed towards the side opposite to that where the head is found, and the forearm is always placed on the anterior plane.

Again, as above stated, it happens at times that the forearm is not doubled up, but, on the contrary, the hand hangs down in the vagina or even appears at the vulva. Now, to determine which is the presenting hand in those cases, it is necessary to turn it in such a way as to place its palmar surface in front and above, for, in this position, if the thumb be directed to the mother's right thigh, it is the right hand, but if to the left thigh, it is the left hand; and then, to find out where the head is, the accoucheur must slip his finger up to the axillary space.

When the hand comes out at the vulva, a careful inspection of it will most generally be sufficient to establish the diagnosis; for instance, if its dorsal surface is turned towards the patient's right thigh, the head is at the right, and if to the left thigh, the head is at the left. The little finger, directed towards the coccyx, indicates that the child's dorsal plane corresponds to the mother's loins, and the same finger pointing to the pubis, is an evidence of this plane being in front.

We have been thus particular in the diagnosis, because it is all-important in trunk presentations to understand clearly which side presents at the strait, since the accoucheur must always endeavor to perform the version; and if the details just given prove difficult

of comprehension from a simple reading, we hope they will become more clear by practicing on a mannikin.

§ 3. MECHANISM.

When the trunk presents at the superior strait, the labour nearly always requires the intervention of art; though, in some rare cases, which may be considered as altogether exceptional, nature alone is adequate to accomplish the delivery, which may then take place in one of two ways; for either the presenting shoulder is driven from the superior strait under the influence of the uterine contractions alone, to make room for one of the child's extremities (therby producing a change in position, and giving rise to what is designated as *spontaneous version*), or, the presenting shoulder descends into the excavation and engages at the inferior strait; yet, notwithstanding, the breech sweeps along the whole anterior surface of the sacrum and of the perineum, and is delivered the first at the posterior vulvar commissure; this latter mechanism is called *spontaneous evolution*.

1. *Spontaneous Version*.—Where the membranes are not ruptured, though the labour has actually commenced, the foetus sometimes enjoys a great latitude of motion in the amniotic cavity, in consequence of which it might, in such cases, readily change its position before the discharge of the waters took place; and it has been known to present, in this way, different points of its exterior surface during the first period of the labour. Sometimes the head ascends in the womb while the breech descends; at others, on the contrary, the nates mount up towards the fundus uteri, and the head becomes located at the superior strait. Consequently, two varieties of the spontaneous version have been admitted, i. e., the cephalic and the pelvic.

This phenomenon usually occurs either just before or else soon after the membranes are ruptured; however, in some instances, a long time elapses after the waters are discharged. The following case, reported by M. Velpeau, will give a very correct idea of what takes place at such times. "A young woman, pregnant for the second time, came into the hospital at ten o'clock in the morning. The os uteri was very little dilated; nevertheless, I could recognize a second position of the left shoulder. The waters did not escape until three in the afternoon, and I did not wish to go after the feet, as the pains were neither very strong nor very frequent, and I had some confidence in the assertions of Denman on this subject. At eight o'clock in the evening, the shoulder had sensibly moved towards the left iliac fossa, and I could then readily detect the ear at the right. At eleven, the temple had almost gained the centre of the orifice; the contractions were augmented in energy; and the cervix was entirely effaced. At midnight, the vertex had become lower; the head engaged; and, in the course of an hour, the vertex was delivered in the right occipito-cotyloid position."*

* With regard to the case in the text, I may say briefly, that the course of M. Velpeau was legitimized by the desire he had of determining the opinions

This case, in which the progress of the labour has been followed and described, step by step, is well suited for explaining the mechanism of spontaneous cephalic version. On the other hand, the reader will easily comprehend that the same phenomena would take place, if the breech, instead of the head, descended towards the superior strait; and, in the above instance, for example, the shoulder, instead of being driven towards the left iliac fossa, would be forced to the mother's right, and then the side of the chest, the loins, the left hip and thigh, would successively appear at the upper strait, and the breech would then engage in the excavation.

In a shoulder presentation, the arm and hand may hang down in the vagina, or even protrude beyond the vulva; but this last circumstance does not preclude the possibility of a spontaneous version, only it is well to bear in mind that the arm may then get up again into the uterine cavity, and this will almost certainly happen if the pelvic extremity descends into the excavation, but it may also lodge on one side of the basin, and thus permit the head to descend alongside of it; the presentation of the cephalic extremity being then complicated by a procidentia of the arm and hand. In the present state of our science, it would be a very difficult matter indeed to point out the various causes, under whose influence it is sometimes the head, and sometimes the breech, which thus, in cases of spontaneous version, take the place previously occupied by the shoulder, at the superior strait. Nevertheless, I am inclined to believe that the irregularity of the uterine contractions is not wholly foreign to such an effect. In fact, when we shall speak hereafter of what the German accoucheurs have described under the name of the partial contractions of the womb, it will be seen that, in some cases, the organ only appears to contract over a limited part of its extent, the remainder being retracted by a much less degree of force, or even perhaps remaining entirely inert. Now, without being able to cite a single instance in support of my opinion, I am strongly inclined to believe, that it is in such a condition of the uterine walls that the spontaneous version would be the most likely to take place. Let us suppose, for example, that when the child is placed in a left cephaloiliac position of the right shoulder, the left side of the uterus alone contracts, the right remaining passive; and it is manifest that the whole expulsive effort, being then exercised on the head, would necessarily depress it towards the centre of the superior strait; and this movement of the cephalic pole will be so much the more easy, in proportion as the inertia of the womb's right lateral wall shall oppose no obstacle to the elevation of the pelvic extremity. But if, on the contrary (in the same position of the child), the right side of the womb only contracted, it is evident the breech alone would receive

at that time (1825) in dispute; but young practitioners should be very cautious how they make such experiments; for although, in the hands of a man like Velpeau, the version, at an advanced period of labour, would have been comparatively easy, yet it must never be forgotten that, in trunk presentations, the soonest possible period after the rupture of the membranes, is the most favorable for the artificial version.

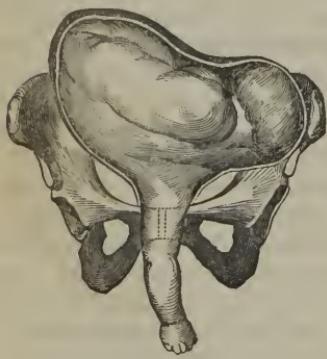
the impulse from the uterine efforts, and then a spontaneous podalic version would be observed to take place.

2. *Spontaneous Evolution.*—The mechanism of spontaneous evolution is much better understood, and we shall find embraced in its description all the divisions of the mechanism of natural labour in the vertex and face presentations. Here, also, M. Velpeau has admitted two varieties, that is, a spontaneous cephalic, and a spontaneous pelvic evolution. But we cannot conceive how a spontaneous cephalic one can take place, unless it be in cases of abortion, or in those where the child is completely putrefied; and hence we shall treat of the pelvic variety alone, taking, as an example, the first or left cephalo-iliac position of the right shoulder, in which the child's head is placed in the left iliac fossa, the breech in the right iliac fossa; the infant's dorsal plane is in front, and its sternal one behind; and its long axis is situated very nearly in the direction of the transverse diameter of the upper strait.

Under such circumstances nearly all the waters escape immediately after the membranes are ruptured, and then the uterus forcibly retracts; and, by compressing the foetal trunk on all sides, it has a tendency to make the presenting part engage in the excavation.

A. Under the influence of the uterine contractions, the child is forcibly bent in the direction of its long axis towards the side opposite to the presenting one; for instance, in the case before us, the head is bent to the left side, and the breech towards the hip of the same side; whence we might designate this first modification effected in the child's situation as the *movement of flexion*.

Fig. 64.



First position of the right shoulder with the arm hanging down.

Fig. 65.



The same position during the descent.

B. A second stage, the period of *descent*, then sets in; that is to say, in proportion as the contractions are renewed, the shoulder approaches more and more towards the inferior strait, and the foetal trunk being bent double, engages deeply in the excavation. But the same difficulty is here met with as in the face presentations (*vide Positions of the Face*); that is, the body being thus placed trans-

versely, it is impossible for the shoulder to reach the lower strait unless the head engages simultaneously with it in the excavation ; or, indeed, unless the neck should be long enough to subtend the height of the lateral wall of the latter, which we have already seen is impossible (*vide Mechanism of Face Positions*). The shoulder's descent is therefore limited to the length of the neck.

c. A movement of *rotation* next occurs, by which the child's long axis that was originally placed transversely, is brought very nearly into an antero-posterior direction, so that its cephalic extremity is placed above the horizontal branch of the pubis close to the spine of that bone, and the breech above, or rather in front of the sacroiliac symphysis. This process of rotation being once effected, the descent may now be completed, since the side of the neck is placed behind the symphysis pubis, whose whole length it can subtend; consequently, the forearm and arm are found to appear at the vulva, and the shoulder to get under the arch of the pubis.

d. The trunk, being now bent double, is forced *en masse* into the excavation, under the influence of the powerful uterine contractions, but the shoulder can descend no further, because it is arrested by the shortness of the neck; hence, the expulsive force acts on the pelvic extremity, which is pressed more and more towards the floor of the basin, and traverses the whole anterior face of the sacrum. It then rests against, depresses, and forcibly distends the perineum; the vulva soon dilates, and the *acromion remaining always fixed under the symphysis*, the following parts are observed to appear successively at the anterior perineal commissure; first, the superior lateral parts of the chest; next, its inferior part, the loins, the hip, the thighs, and lastly, the whole length of the inferior extremities; and there only remain the head and the left shoulder in the excavation, which are soon after extracted or expelled without difficulty. This last movement may be considered as the fourth stage of the labour, and it is therefore named the period of *deflexion*, or disengagement. It takes place around the shoulder, situated under the symphysis as a centre, and therefore, if lines be drawn from this centre, terminating at the various points on the child's side, we shall have all the radii, or the foetal diameters, which clear the antero-posterior one of the inferior strait.

Fig. 66.



Position of the child after the rotation, and just at the moment when the process of disengagement begins.

Fig. 67.



The same position, with the delivery more advanced.

Such is the exact mechanism of the spontaneous evolution in those cases where the child's posterior plane was originally in front ; or in other words, in a first position of the right or a second of the left shoulder, for there is no difference in this last, excepting that the movement of rotation must take place in the opposite direction, that is, the head must pass from right to left and from behind forward, and the breech from left to right and from before backwards. But when the sternal plane of the fœtus is primitively directed towards the mother's front, as in the first position of the left, and the second one of the right shoulder, the process takes place somewhat differently ; thus, M. P. Dubois, who had an opportunity of seeing two cases of this nature, informed me that, at the moment when the breech disengaged at the anterior perineal commissure, the child's whole trunk underwent a movement of torsion that again brought its dorsal plane forwards and upwards, which plane, without this process of torsion, would still have been directed towards the anus ; whence we find, even here, remarkable as it may seem, the influence of that general law which was observed to regulate all natural labours, namely : that, *whatever may have been the original relations of the child's posterior plane, it ultimately comes into correspondence with the anterior parts of the pelvis.*

As observed in the commencement of this article, the mechanism of spontaneous evolution may be subjected without impropriety to the same divisions as the delivery by the face. In fact, we have a first period of *flexion* of the child's trunk towards the side opposite to the presenting one ; a second, of *descent*, interrupted by the third movement, or period of *rotation* ; a fourth, of *deflexion*, or *disengagement*, and even, according to the observations of M. P. Dubois, we might add, for the dorso-posterior positions a fifth, the period of *exterior rotation*.

§ 4. PROGNOSIS.

We again repeat, for it seems highly important that this should be firmly impressed on the student's mind, that in trunk presentations a spontaneous expulsion of the child is wholly an exception to the general rule, and one upon which no reliance can be placed, unless in a case of abortion ; and that the resources of our art are demanded in every case just as soon as the necessary conditions exist for such intervention. (*Vide Version.*)

In fact, by consulting the published cases, or indeed by simply reflecting on the mechanism by which the delivery is effected, we realize how this must expose the woman to a very long and painful labour, and the fœtus to so violent a compression that its death must often result in consequence. According to the statistics furnished by M. Velpeau, one hundred and twenty-five children, in one hundred and thirty-seven were stillborn. It must not be supposed, however, as some persons appear to have done, that this accouchement is only possible in cases of abortion ; for facts too numerous militate against this opinion for it to be any longer tenable.

Burns justly remarks, in endeavoring to demonstrate the phy-

sical possibility of an evolution, that the greatest diameter which then has to clear that of the pelvis, extends from the superior and lateral part of the neck to the apex of the sacrum, and measures five inches and a half; sometimes the distance is barely five inches, and continued force may make it less; hence, however little the dimensions of the pelvis may be supposed to be above their normal condition, there is nothing here physically impossible, as has been affirmed and reaffirmed, doubtless without mature reflection. The favoring circumstances which render a spontaneous evolution easier and more likely to take place are: a premature labour, the smallness of the child, a large conformation of the pelvis, energy of the contractions, diminished resistance from the soft parts, numerous antecedent accouchements, and the readiness with which the woman has heretofore been delivered of large-sized children. The opposite circumstances would render it exceedingly difficult, if not wholly impossible.

CHAPTER IV.

OF THE NECESSARY ATTENTIONS TO THE WOMAN DURING AND AFTER LABOUR.

ARTICLE I.

OF THE ATTENTIONS DURING LABOUR.

WHEN the accoucheur is summoned to a woman in labour, he should always provide himself with lancets, a female catheter, and the forceps; and, if in the country, he should have besides some ergot, either in grain or else freshly powdered, and one or two drachms of Sydenham's laudanum.* His arrival ought always to be announced before entering the patient's chamber, for the emotion caused by a sudden entrance has often proved sufficient to suspend the pains for a considerable time. Then, after having made the usual inquiries as to the time at which the pains began, their frequency, their duration and intensity, he might, if he supposes from this account the labour is somewhat advanced, proceed at once to the vaginal exploration; in the contrary case, he may wait a few minutes as well to satisfy himself of the value of the communications made by the attendants, as to give the woman time to prepare for the examination. When he finally judges this is necessary, he is to proceed with all possible decency, and always during the interval between the pains. The object of this is to endeavor to ascer-

* It is not customary with American practitioners to go so well armed; the forceps especially might be omitted, as the sight of the instrument would occasion much alarm.—*Translator.*

tain: 1. Whether the woman is pregnant; 2. And if so, whether she is in labour; and 3. If at full term; 4. If the membranes are ruptured; 5. Or the travail is advanced; 6. To find out what is the condition of the cervix uteri, the vagina, and the perineum, and what is their degree of suppleness or resistance; 7. What is the conformation of the pelvis; and lastly, 8. What part of the child presents. At first sight it may seem a ridiculous precaution to attempt to verify the existence of the pregnancy in a woman who declares she is actually suffering from the pains of childbirth; but, to say the least, this is not altogether useless, since it has unfortunately happened that some over-confident accoucheurs have been imposed upon by women who were themselves deceived as to the nature of the pains they felt; and we might quote many instances where, after having waited for the delivery to take place for several days, they have ultimately been constrained to acknowledge their mistake. Besides, this error is easily avoided by bearing in mind the diagnostic signs pointed out in the article on *Pregnancy*.

After observing the progress of the pains for some instants, he should next endeavor to ascertain their cause and nature, in order to favor those which have a bearing on the accouchement, and to combat any that are foreign thereto; for women are not unfrequently tormented by pains during the latter stages of gestation, which are dependent on some sympathetic disorder of the intestines, or abdominal organs, and which even a physician might mistake for the commencement of labour; these have been denominated the *false pains* by way of distinguishing them from those produced by the contraction of the womb. The true and the false pains may be recognized by the following characters: the latter are ordinarily seated in the region occupied by the diseased organ, while those occasioned by the commencement of the travail usually begin about the umbilicus and loins, and die away at the perineum, the anus, or the sexual parts; the false are almost continuous, and their intensity is nearly uniform; but the others, on the contrary, are intermittent. If the irregularity in the return and progression of the pains be such as to leave any doubt as to their character, he should interrogate the neighboring organs, and by a little attention he will succeed in determining their seat and nature. Besides these, there are yet some others which have their seat in the uterus itself, affecting a certain degree of regularity, and simulating a true labour, which are dependent on a plethoric condition of the organ that may be calmed by rest, a restricted diet, and blood-letting. Further, the epoch at which they occur, and the absence of the other phenomena of labour, will serve to lessen the difficulties in determining the diagnosis; nevertheless, it is the touch alone that can dispel all doubts; for the hardness that comes on in the uterine globe, the rigidity in the circumference of the os uteri, the tension and protrusion of the membranes during the pain itself, together with the retreat and relaxation of all these parts in proportion as it diminishes, characterize the pains of childbirth in an infallible manner.

"By examining," says Wigand, "the course of the true contrac-

tions, it will be found that they commence at the cervix, and pass to the fibres of the fundus, which are then thrown into action; and hence all contractions that begin in this latter part of the womb are anomalous, and result either from some disorder having occurred in the uterine forces, or else they are produced by an inflammation, or a disturbance in the functions of a neighboring organ." When the true pain is manifested, the head, which reposed during the interval on the cervix, sometimes mounts up even beyond the reach of the finger, but the membranes engage more or less in the orifice. In the course of a few seconds, the contraction extends all over the uterus, and more particularly to the fibres of the fundus; and the head, which was at first elevated, is forcibly pressed down on the neck, thus assuming the office of a wedge for hastening its dilatation; and, as a general rule, it is only when the fundus contracts in this manner, that the woman complains of pain. We may, therefore, consider the true pain as constituted of a series of phenomena, which succeed each other in the following order: first, the periphery of the cervix becomes tense; then, the presenting part ascends, and the membranes bulge out; next, the remainder of the uterus, the fundus especially, becomes hard, during which the patient complains of a sharp pain; and, lastly, the part that presented endeavors anew to engage. It is unnecessary to add, that the rapidity with which these phenomena succeed each other, necessarily varies according to the individual, to the irregularities offered by her accouchement (which we shall hereafter study), and according to the stage of the travail. Other things being equal, the contractions will effect the dilatation so much the sooner, as the cervix shall correspond more directly to the fundus of the organ, and the uterine axis shall be the more parallel to that of the pelvis.

After having learned the true character of the pains, the accoucheur next endeavors to ascertain whether the woman is really at term, so as not to encourage a premature labour, which might often be prevented if he knew its real nature. He ought, therefore, to recall the various signs, by means of which we have attempted to characterize the different periods of pregnancy. Thus, should he find that the cervix is not yet entirely effaced, that it still retains a certain degree of length, that it is hard and resistant even during the interval of the contractions; that the latter are much less regular in their course, duration, and return, than in parturition at full term; and the belly not yet sunk down; he may justly conclude that such a premature labour is owing either to some acute moral emotion, or some antecedent external violence. And, in all cases, he ought to attempt the arrest of this premature or false travail, by rest, both of body and mind, by venesection, if the woman's general condition will admit of it, and, more especially, by the administration of laudanum in full doses, taking care to empty the bladder when necessary, and to keep the bowels free by mild laxatives.

However, there is one phenomenon, sometimes manifested in the latter weeks of gestation, which may place the most skilful practi-

tioners in default. I allude to what has been designated as the *false labour*, in which certain women, after having nearly reached their full term, experience the true contractions; the pains are regular, the membranes bulge out, and the os uteri dilates; at times, these pains last from four to six hours, but then they disappear all at once, and everything goes on as usual. In others, the false labour is kept up at first during several hours, and then it passes off, returning in this manner every day, particularly towards the evening, and lasting one or two weeks. (Vide *Uterine Rheumatism*.)

Where he is very sure that the woman is really in labour, his attention must be directed to the frequency and the intensity of the pains, and to the dilatation, the hardness, and thinness of the cervix, in order to judge of its probable duration (see page 301). Also, during the same exploration, he should ascertain the conformation of the pelvis, particularly if the woman happens to be in her first confinement, and if any apparent deformities exist, and learn the situation of the orifice, the obliquity of the body and neck of the womb, and the child's presenting part. (Vide *Mechanism of Labour*.) If this latter is so high up as to render the diagnosis of the presentation difficult, its examination should be deferred until a more advanced period of the travail; but the bag of waters is never to be ruptured, in any case, for the mere purpose of rendering this examination more easy, before the entire dilatation of the neck; for such an untimely rupture of the membranes would be attended by very great inconveniences, if the position were at all defective; for, all the waters escaping, the foetus might suffer from the pressure exercised directly upon it by the uterine walls; the umbilical cord would be compressed; and the womb, being irritated by the prolonged contact of the foetal inequalities, might be affected with spasmoidic contractions; and, finally, the intervention of art becoming necessary, long after the evacuation of the waters, the necessary manipulations would be attended with much greater difficulties.

The accoucheur should next ascertain whether the child is living or dead, as it is highly important to determine this point, in order to diminish his own responsibility, by advising the family of the fact. This diagnosis may be made out without much difficulty, by attending to the perception of its active movements, to the beating of its heart, the pulsations in the umbilical cord, when accessible to the finger, and by the tumor formed on the head pending the throes of labour.* But of all these signs, those furnished by ausculting

* When the head is fixed at the superior strait, and the uterine contraction is exerted over the whole fetal trunk, a considerable tumor is developed on the former, if the child is living, but this does not take place when it is dead; although Merriman asserts that it may still be felt, even when the child is known to be dead. Perhaps the best mode of judging the infant's condition, by the tumefaction of the hairy scalp, is the following: where living, it is observed that, at the moment when the head is strongly urged down by the contraction of the womb, the bones overlap each other, and, as a consequence, the scalp becomes folded, and thus constitutes a temporary tumor; but immediately after the pain is over, the head regains its primitive form, by the expansion of the cranial bones, and the folds and tumefaction previously exhibited

the heart's action, which is always perceptible when the foetus is living, are the best by far. In fact, it is possible for the pulsations in the cord to become arrested, without the child's death necessarily resulting therefrom; for it sometimes happens that they stop during the pain, only to reappear again in the interval of the contractions. Consequently, to render the diagnosis more certain, the cessation in the pulsation should last for some time, at least for ten or fifteen minutes.

But it is not always so easy a matter as one might imagine to ascertain whether the membranes are ruptured or are still intact; for instance, where the vaginal examination is resorted to, between the pains, in a vertex presentation, they are often applied so directly to the scalp that it is impossible to distinguish them. A pain should then be waited for, because, as soon as the uterus contracts, it drives the waters towards the lower parts, and the finger is observed to be raised up by a small quantity of this fluid that insinuates itself between the head and the amniotic sac, the integrity of which latter is thereby easily verified; but where the head is more deeply engaged, this afflux of liquid is very inconsiderable, and the tension of the membranes can scarcely be distinguished. Consequently, attention should be given to the state of the tumor both during and after the contraction. Again, where the waters have escaped, and the finger comes directly upon the child's cranium, it will detect the hairy scalp puckering up, while the pain lasts, and becoming smooth and even as soon as it shall have ceased; though the contrary will take place when the membranes are intact, for they are never more smooth or more tense than during the contraction itself.

It is difficult at times to reach the cervix uteri in the commencement of the labour, because it is then carried so far backwards, that the plane of its orifice actually looks towards the anterior face of the sacrum; and I have often seen young practitioners who were unable to get at it at all, and others, who, not finding the os uteri, and distinctly feeling the child's head through the anterior inferior part of the womb, which is then rendered very thin by the distension it has undergone, have imagined that the dilatation was already completed, whereas it had hardly commenced; and the disastrous consequences such an error might lead to, can be readily imagined. In fact, it is very often necessary to pass the finger around the convex tumor which fills the excavation, in order to get the index far enough upwards and backwards, where the uterine orifice is to be found.

All these questions being determined, the accoucheur's attention

by the skin disappear, or, at least, considerably diminish. On the contrary, however, if it be dead, the expansibility of the bones is destroyed, and the head does not re-assume its primitive form and volume after the contraction has passed off; wherefore the tumor formed by the doubling of the hairy scalp still persists, in a great measure. Now, in this condition of affairs, the swelling is greatly augmented from the liquids forced in by the superior pressure; and whenever, in such cases, a perforation of the cranium has to be resorted to, practitioners well know there is half an inch at least of soft parts to be traversed before reaching the bone. (*Merriman's Synopsis.*)

should be directed early in the progress of the confinement to having the woman moved into the most suitable place. The chamber intended for her lying-in should be spacious, airy, well-lighted, and retired; the air she respires ought to be pure and of a moderate temperature, and all strong odors, whether good or bad, should be excluded. A temperature too elevated will predispose her to nervous agitation, and to hemorrhagic accidents; and, on the other hand, the impression of cold is a very frequent cause of acute inflammations, or of chronic engorgements, such as those that often come on after the delivery, which have for so long a time been attributed to the lacteal metastases. But few persons are to be admitted in the chamber, and all those, especially, whose presence is at all unpleasant to her, ought to be rigidly excluded. This latter point demands the greatest care on the part of the physician, for it is he alone who has authority thus to dismiss such as he may think useless or injurious, and he must judge, from the reception given to each, of the pleasure or otherwise the patient experiences from their presence. Some women are almost ashamed of being delivered in the presence of the husband; with others, on the contrary, it is one of the greatest consolations to have him near them, and the accoucheur must endeavor to find out all these little shades of delicacy and feeling, to sound, by discreet and artful questions, a wish that the woman herself at times fears to express, and, after having once learned it, he should religiously comply with it. As a general rule, the mother and sister, or even two intimate friends of the patient, besides the nurse, are the only ones that are to be allowed to stay in the room. With regard to dress, her garments should be full, sufficiently so, as neither to incommod her movements nor her respiration.

If some time has elapsed since she has had a passage from her bowels, a simple injection must be given; and where this does not prove sufficient to procure a stool, a second is to be immediately administered with the addition of one or two ounces of the *miel mercurial*.* The evacuation of the matters contained in the rectum is the more necessary, as the distension of this gut might subsequently retard the escape of the head, and likewise prevent that of the intestinal gases, whose accumulation might bring on colic and gripings; besides, this precaution has the advantage of sparing the woman the shame and disgust which an involuntary expulsion of the feces during the last moments of labour would necessarily cause, as also of preventing the accoucheur's hand from being soiled, while it supports the perineum. Her bladder likewise requires attention, and the catheter should be resorted to when the emission of urine does not take place.

He should also attend early to having everything prepared that may be wanted somewhat later; thus, the thread intended for the

* This preparation is only used as an injection; it is prepared by taking equal parts of clarified honey and the juice of the *mercurialis annua*, a plant belonging to the tribe of the Euphorbiaceæ, and reducing them to the consistency of a syrup.—Translator.

ligature of the cord is to be laid out, and the bands and linen for covering the child's navel are to be cut; for the mother, he ought to procure some cold iced water, vinegars and smelling salts, agents that will probably be unnecessary, but which, notwithstanding, he ought always to have at hand; and lastly, he must direct the preparation of the bed upon which the woman is to be delivered. This bed (called the lying-in bed, the bed of misery, or the little bed) is arranged in the following manner: one with a sacking-bottom is procured, of a moderate height, and about two feet to two and a half in width, and one end of it is placed against the wall, being careful to keep it clear on both sides, so that he can pass freely all around it. A first mattress is placed on the bottom, and upon this a second, which covers its upper part, and is folded double towards its superior third, in such a way as to leave the first one uncovered about the foot. An oil cloth, then a sheet, some pillows and a coverlet, complete the bed of misery. A solid bar is placed transversely across the foot of the bed, so as to give the woman's feet a solid point of resistance in the last moments of the travail. In France, the patient is placed in such a way that the superior part of her back rests on the inclined plane formed by the second mattress, and her breech at the margin of the same mattress; the inferior extremities are slightly flexed, and the feet press against the transverse bar placed at the foot of the bed. In England, women are delivered on the edge of their beds; they lie down on the right side, having their legs and thighs flexed, and their knees separated by pillows. In Germany, the lying-in chair of the ancients is used; the patient is placed on an inclined plane, which can be modified at will, by lowering or raising the back, by means of a rack; the woman then draws on the arms of the chair, and presses her feet against the rounds with which it is supplied, and, as she gives way to the throes of labour, the sexual parts are uncovered, and correspond to the opening made in the edge of the seat. But, on the whole, the bed, furnished as we have described, appears preferable, the more so, because it is always at hand; and, as suggested by Desormeaux, it is particularly suitable where the woman must remain recumbent during the whole progress of labour, as is necessary in those cases where she is affected with hernia, or is threatened with hemorrhage, prolapsus, or a displacement of the womb. In case of necessity, its place might be supplied by a table and a few chairs placed against the wall. It would be much better, say Desormeaux and M. P. Dubois, where the family are in easy circumstances, to make use of an ordinary bed, taking care, however, to supply it with a rather hard mattress, and a hard cushion near the buttocks, to prevent the pelvic region from sinking down into the substance of the mattress, and the borders of the hole, thereby produced, from forming an obstacle to the extension of the coccyx, or the escape of the child's head. On this bed, the woman is more at ease; she can lie on her side, or take the most convenient attitudes, and even sleep during the interval of the pains; and then, after the delivery, she may remain there some time before being transported to another.

Ought the accoucheur to remain constantly with the patient? This is a question whose solution varies according to the character of the female herself, and the greater or less intimacy existing between her and her physician, for there are some timid women who desire to have him always close at hand, and others again, who are impatient and annoyed by his continual presence. But in all cases, he should bear in mind that, during parturition, the patient very often wishes to urinate or to empty her bowels, and he ought, therefore, to go from time to time into an adjoining chamber, in order to give her the desired opportunity. Again, during the travail, a wife is frequently cheered up by the caresses and consolations bestowed by her husband, and the physician will understand that his presence at such times must act as a restraint, and he should discreetly withdraw, or, at least, not observe what is going on. Further, he may absent himself more frequently during the period of the dilatation; for instance, after having made the examination, and ascertained that the child's presentation and position are both favorable, he might, if the cervix was just beginning to dilate, attend to his other occupations, and return again in the course of a couple of hours; but if the diagnosis of the position had been impossible, or if the latter had proved to be a vicious one, he must not quit her under any pretext, in order to be always ready to ward off any accidents which might subsequently demand his intervention. When the stage of expulsion commences, the accoucheur places himself at the right of the bed, on a chair of a suitable height. The part he has to perform consists, in a natural accouchement, in ascertaining, from time to time, by the touch, the progress of the labour, in directing properly the bearing-down efforts of the patient, and in sustaining the perineum with his hand while the child's head is passing through the soft parts.

During the first stage, the woman may lie down, sit down, or walk about, at her pleasure; indeed, this frequent change of position even renders the slowness and fatigues of childbirth more supportable; but, at the end of this stage, when the dilatation is completed, and the amniotic sac, from its forcible bulging out, is on the point of yielding, she must then resume her bed; and this precaution is particularly indispensable in those who have already borne several children; because, in them, the expulsion of the fœtus sometimes follows so promptly after the rupture of the membranes, that the patient has not always the time to regain her bed, and is liable to be delivered standing. Though where, after the rupture, the progress of the labour is slow, and the head is more or less engaged in the excavation, or has already descended as low as the perineum, but does not advance, and the pains seem to become more and more feeble and distant, it is advisable to recommend her to get up and walk about, having her supported by assistants, if her own strength does not permit her to walk alone, for it is found by experience that bodily motion seems to give more activity to the uterine contractions. In the contrary case, she must not leave the bed without some special indication. Where the patient is tormented by pains in the

loins, we may relieve them by stretching a folded napkin under the small of the back, and directing two persons placed at the opposite sides of the bed to pull on the extremities of the towel during the pain. Attempts should also be made to assuage the cramps, so often experienced in the thighs and calves of the legs, by frictions over the suffering parts.

Some nervous women are troubled with tremblings and chills, in the very commencement of their labour, which are at times sufficiently marked to cause much inquietude. Dewees observed that they often coincide with an unusual rapidity in the dilatation of the cervix; and he says, "a lady awoke with a smart rigor from a sleep, and who every moment expected her labour to commence. The nurse became alarmed, and I was immediately sent for. When I arrived, I found her still trembling very severely, but she had not experienced any symptom of labour; she assured me that nothing was the matter with her, except what I was witnessing, namely, an agitation of the whole body, which she could not, by any effort, control. In about five minutes she cried out she believed her labour was coming on; and this really was the case, and so rapidly as not to give me time to place her in a proper situation for delivery; she was delivered in less than five minutes from the time she first called my attention to her." These shiverings are sometimes renewed during or immediately after the travail; but, in no case, do they merit a serious attention.

Patients are often frightened at the time the bag of waters is torn, and it is, therefore, a good plan to advise them of it beforehand; and the precaution should also be taken of placing a sponge or some old linen near the genital parts, so as to receive the liquids as they escape. Immediately after the discharge of the waters, it is advisable for the practitioner to assure himself anew of the presentation and position, lest he might have been deceived in the first examination.

The rupture of the membranes generally takes place spontaneously, but this is not always the case, and the accoucheur must sometimes interfere. Because it is very certain that, when the uterine orifice is entirely dilated, when the membranes are forced into the vagina by a large quantity of fluid, and the head is movable, but still the contractions do not produce a spontaneous rupture of the membranes, it is evident, we repeat, that they, by their resistance, protract the termination of the labour. And although this obstacle is never insurmountable, by the efforts of nature alone, yet the delay in the delivery and the dragging on the membranes may be attended with some inconveniences; and it is, therefore, better to lacerate them, by taking advantage of a strong contraction, and, while they are greatly distended, the index finger is forcibly pressed against the centre of the tumor.

When this rough pressure is not sufficient, we scratch the membranes with the finger-nail; and, by gradually weakening the three tunics, succeed in rupturing them. Sometimes, however, they still resist, and then some instrument, such as a blunt probe, or, still

better, the end of a quill cut down, is directed up to them along the finger. Where the waters are *flat*, that is, when but little liquid intervenes between the membranes and the head, some care is requisite, in using the little instrument, to direct it obliquely, so as not to wound the foetus with its point. Rupturing the membranes is, therefore, a trifling, simple operation; but it is not, on that account, to be indifferently practiced in all cases, lest the physician may often have to repent of determining the discharge too soon. Indeed, I cannot do better than by extracting the following rules from a memoir by Gardien on this subject.

"In natural labour," says he, "the membranes are only to be ruptured when the subjoined conditions are met with: namely, a complete dilatation of the os uteri, a clearly established diagnosis of the presenting part, and the ascertained absence of all mechanical obstacles to the delivery."

I will add, that they must not be ruptured when the position is unknown, until the dilatation of the cervix is completed; because, the foetus, floating about in the liquor amnii, does not suffer from the uterine contractions that are necessary to the neck's dilatation; because this process is singularly aided by the engagement of the inferior segment of the membranes in the orifice; and, lastly, because, if there is really a vicious position requiring the intervention of art, such intervention will be much easier to the accoucheur, as well as less difficult and less painful for the mother, if it is resorted to while they are still intact, or at least recently broken, than if the discharge of the fluid had occurred several hours previously.

In a case reported by Baudelocque, the child was so movable that it successively presented every part of the surface of its body at the os uteri. In a woman whose belly was distended by a great quantity of water, M. Martin, of Lyons, had recognized the feet and one hand through the membranes. "I then felt disposed," says he, "to terminate the labour, when, at the request of her husband, I called in a friend in consultation; but, on touching her again, before his arrival, I detected the head where I had previously found the feet and hand, when I immediately punctured the membranes, whereby the head was fixed at the superior strait and the accouchement rendered natural." (*Comptes Rendus*, p. 155.) Should a case of this nature be met with, the rule we have just given might be laid aside, and the membranes be ruptured, however inconsiderable the dilatation. It is scarcely necessary to add that an artificial rupture is only to be resorted to when the foetus shall be detected presenting by its cephalic extremity; for then the discharge of a certain quantity of the amniotic liquid, and the retraction of the uterus, will irrevocably fix this part at the upper strait.

Again, according to the majority of writers, the membranes may be lacerated before the entire dilatation of the cervix, where there is reason to suppose that the waters, from their too great abundance, may distend beyond measure, and thus weaken the contraction of the uterine walls; but, even here, Gardien recommends the greatest circumspection, and advises the previous employment of all the

measures calculated to stimulate the contraction of the womb. The finger ought to be introduced into the vagina several times in the course of the last stage of the labour, both during the pains and in the interval between them, to ascertain the progress of the head in the excavation. Nevertheless, this exploration is to be resorted to as rarely as possible, and only when the interest of the mother seems to demand it.

Most women, supposing that they can materially hasten the termination of the travail by making the most of their pains, contract their muscles, bear down violently, and make extraordinary efforts at the beginning; but these uselessly exhaust their strength; for, so long as the neck is ineffaced, and the bag of waters unbroken, all bearing-down effort is fruitless. But, in the second stage, where the head descends into the excavation and rests on the perineum, she should be encouraged to aid the uterine forces by a voluntary contraction of the muscles of the trunk and limbs; though, as soon as the pain has passed off, all the auxiliary efforts should be at once suspended. Again, in the latter moments of the travail, just when the head is about to clear the vulva, the pains are so sharp that the woman naturally gives way to incredible exertions, which may possibly occasion serious accidents; hence all the powers of persuasion should then be employed to induce her to moderate her strainings.

Pending the last moments of childbirth, the pressure on the lower part of the rectum, produced by the child's head, creates an urgent desire of emptying the bowels; and many women, yielding to a misunderstood modesty, then wish to rise and retire to the closet; but it would be exceedingly imprudent to comply with their demand, and they must not leave the bed under any pretext whatever. At first, this desire is often illusory, more especially where the precaution has been taken to empty the intestine at the commencement of labour; and then it may happen, as I once witnessed, that the patient, surprised by a violent pain, is delivered on the close-stool, without the physician being able in any way to render her the necessary attentions.

It is in those last moments that the accoucheur must give all his attention to supporting the perineum, which is done by pressing the whole perineal surface equally, and with a moderate degree of force, by the palmar face of the hand. The latter is applied in such a way as to make the radial border of the index finger cover the anterior margin of the perineum, the ends of the fingers corresponding to the left side, and the thenar eminence of the palm to the right side of this partition, while the thumb is held to the right of the labia externa. The pressure should be somewhat greater near the anus, so as to give the foetal head a forward direction, and facilitate its movement of extension.

Immediately after the expulsion, the disengagement of the head is completed, either by carrying it more and more towards the pubis, or by insinuating the index upon one side of the lower jaw; this being accomplished, we must next ascertain whether the cord

does not make one or more turns around the neck, and, if so, gentle tractions must be made on its placental extremity, to prevent its being dragged down, strangulation of the foetus, etc.; and when a sufficient extent of it cannot be brought out, to render the prevention of such accidents certain, we have to cut it, and terminate the labour as promptly as possible, by hooking one or the other shoulder with the forefinger.* After the head is born, the womb, exhausted by its last efforts, remains passive for some instants, and it frequently happens that the child begins to respire and cry, even before the delivery of the chest. We may, therefore, wait patiently until the contraction is renewed, simply supporting the head, lest the mouth and nose be choked up by the cloths or blood found between the woman's thighs; but if the atony is prolonged, and more especially if the face of the new-born infant is observed to be red and tumefied, as sometimes happens after painful accouchements, the remainder of the travail ought not to be left entirely to nature, but new pains should be at once solicited by frictions over the abdominal walls, and the patient be encouraged to bear down; and if these measures prove insufficient, the index finger, curved like a hook, is to be placed in one of the arm-pits, and the disengagement of the anterior shoulder thereby first effected.

In those rare cases, where the occiput remains posteriorly until the end of labour, most accoucheurs have recommended that an attempt should be made to bring it round to the front, but we doubt whether this will often prove successful, although we have never seen it tried, nor ever attempted it ourselves; for we believe that where the process of rotation does not take place spontaneously, all efforts to produce it artificially would be useless, not to say injurious. Nevertheless, most authors advise, when the head has descended into the excavation immediately after the discharge of the waters, to make it deviate either towards the right or the left in the *interval between the contractions* (Velpeau), by slipping two or three fingers either along the sacrum, to press the occiput forward, or else upon the side of the forehead, behind the pubis, to carry it backward. Though, if we should ever entertain the thought of attempting this manœuvre, we would much prefer acting during the contraction, for then we should only aid, without absolutely supplanting nature, by applying two fingers on the child's temples and acting above in such a way as to turn the forehead posteriorly. But, we repeat, this appears unnecessary in the great majority of cases, because it only hastens the process of rotation, which would have subsequently taken place without it; and even hurtful in others, for the efforts used to bring it about might exert a pernicious influence both on the mother and her infant.

In fact, in ordinary cases, where the rotation is naturally pro-

* These folds may occasionally be drawn so tightly as to strangle and kill the infant, as occurred in the following case: "Upon approaching a woman who had just been delivered, I found the child dead, and still lying near the genital parts; the cord made three turns around its neck, and they were so firmly tightened that a deep ecchymosis was seen on this part." (Guillemot.)

duced, the trunk follows the movements of the head ; but where this latter has been turned by the fingers, the body remains immovable, and hence the process of forced rotation may dislocate the occipito-atlido-axoid articulation and kill the child.

The older accoucheurs thought that a spontaneous delivery, in face presentations, was altogether impossible, and consequently they advised an endeavor to be made, in the very outset of labour, to convert them into vertex positions ; but we of the present day better understand the value of such opinions. However, the rotation by which the chin is brought under the symphysis pubis, whatever might have been its primitive relation to the superior strait (*vide Mechanism of Delivery by the Face*), is difficult, painful, and sometimes even, in the mento-posterior positions, does not take place at all ; and it will be seen, further on, that the non-accomplishment of this movement forms one of the most serious complications met with in practice, and that craniotomy often becomes necessary in consequence. Therefore, whenever the attendant is fortunate enough to detect such a position before, or just after, the membranes are ruptured, and consequently while the part still retains a considerable degree of mobility, it seems advisable to make an effort to flex the head, and thus convert a mento-posterior into an occipito-anterior position ; but we shall have occasion to revert again to this subject hereafter. When the face is engaged at the inferior strait, and the chin is found under the pubic arch, the movement of flexion begins, and then, as has been shown, the pressure to which the vessels of the neck are subjected, during the fourth stage, may retard the circulation enough to determine death by cerebral congestion. Hence, we learn what great precaution is necessary in supporting the perineum, since it must be evident that too great a pressure made upon this part would necessarily augment the compression of the child's neck.

The delivery by the pelvic extremity ought to be abandoned entirely to nature, unless there are some unfortunate complications. We have already insisted upon this point, in the note at page 351 ; but do not hesitate to repeat again the advice, not to resort to any traction in a natural labour by the breech, because, as there stated, a stretching out of the arms, and sometimes even an extension of the head, result from such imprudent tractions, whilst these complications are scarcely ever met with where the child's expulsion is left to the uterine contractions entirely. Now, there is no difficulty in comprehending these different results, for when the womb is the sole agent of the child's delivery, the latter is forcibly urged on by the circular fibres at the superior part of the organ, and at the same time is strongly pressed on its sides by the longitudinal fibres. The upper extremities are therefore maintained against the lateral and anterior parts of the chest, the head is kept flexed on the thorax, and all these parts descend together ; but, on the contrary, if any tractions are made, they only act on the trunk, which then descends alone, while the arms, being arrested by the margins of the cervix uteri, or by the periphery of the straits, do not participate in the

descent, and are ultimately found placed against the sides of the head; hence, the accoucheur's exclusive duty consists in receiving and supporting the child's lower parts as they become disengaged; taking care, as soon as the breech has cleared the vulva, to ascertain the condition of the cord. For that purpose, the forefinger is slipped up as far as the navel, when, if the cord is found to be tightened at its umbilical insertion, he joins the thumb to the index so as to produce some traction on its placental extremity only, with the view of preventing both its being dragged upon, and its possible laceration. The cord sometimes gets between the infant's thighs; and, in such cases also, the loop thereby formed must be enlarged by pulling on the placental extremity, and then by disengaging it from the posterior limb, bring it into contact with the perineum, that is, with soft parts whose compression will be less severe, and consequently less dangerous to the circulation than what it would suffer from the symphysis pubis; but if it is too short to be brought to the exterior, it must be cut, and have a ligature applied on its umbilical extremity, and the labour is to be terminated in the promptest manner possible.

But whatever may have been the cause, the death of the foetus always results from the slowness with which the shoulders and head are expelled, for it is only during this last part of the travail that the cord is compressed, or a separation of the placenta takes place; and, although we have condemned all traction in general, it must be otherwise under such circumstances. But how is it possible to determine the period beyond which it would be imprudent to wait? We answer, that as soon as asphyxia comes on, the suffering state of the child may easily be detected by examining the portion of the cord which remains exterior; and if the pulsations still maintain their intensity, their frequency and habitual regularity, the rest of the process may be abandoned without danger to the powers of nature; but, on the contrary, if they are found to relax, or even to become more rapid, though at the same time more feeble, thread-like, and especially if intermittent or irregular, every effort must be used to remove the foetus from the danger which threatens it.

When the head alone remains behind in the pelvic excavation, the child is very often observed to dilate its chest actively, and make a violent inspiratory effort, which may be referred to a rapid convulsive contraction of the diaphragm and abdominal muscles, repeated at irregular intervals; now such acts never take place while the foeto-placental circulation remains intact, since the pulmonary respiration is unnecessary so long as the placental one is going on, and therefore these struggles constantly announce a state of suffering, or of imminent asphyxia, from which the infant must speedily be relieved.

Again, where the head alone is undelivered, the patient must be encouraged to bear down strongly, so as to hasten the termination of her labour, and avoid a prolonged compression of the cord; and the accoucheur might facilitate the head's flexion by gently carrying the trunk up in front of the symphysis, or, when the flexion appears difficult, he may, by insinuating two fingers under the symphysis,

press slightly on the occiput; for a comparatively light force exercised on the posterior part of the head is often sufficient to reverse the great occipito-mental diameter, and terminate the labour. When the head resists all these attempts, other measures become necessary; but they belong to instrumental delivery, and we shall treat of them in the article on *Version*.

It is not at all uncommon to find the meconium escaping in greater or less quantities during parturition; and, as previously stated, this peculiarity most frequently occurs in the positions of the pelvic extremity, and is then of little consequence; but this does not hold good in any other presentation: for in them its discharge is always an unfavorable sign, one calculated to arouse the anxious solicitude of the medical attendant, as it usually indicates a state of suffering on the part of the child, and not unfrequently a compression of the cord; for it must be apparent on the least reflection, as to the part performed by the placenta during the intra-uterine life, that an interruption in the foeto-placental circulation produces asphyxia, which latter determines a cerebral congestion, and sometimes even an apoplectic effusion, whence a paralysis of the sphincter ani results. Now, if to this palsy of the sphincters, we add the instinctive acts of respiration* made by the foetus, which are the more violent as they are the more ineffectual, we can understand without difficulty how an escape of the meconium may result from a compression of the cord.

As regards the prognosis, it is important to observe the precise moment at which this discharge takes place, as it is always serious when it does not occur till some time after the rupture of the membranes; though the waters, when they escape, are often colored yellow, and the presence of the meconium then is not necessarily an alarming symptom. In some cases, it may indeed indicate an actual compression of the cord; but it may also result from a compression that had existed some time before birth, which may have compromised the child's life for a few moments, and then had all at once disappeared in consequence of some brisk movement of the infant. On the whole, therefore, a discharge of meconium in breech presentations, is of little consequence; but, in the other presentations, and where occurring some time after the rupture of the membranes, it is always an unfavorable sign; though, to judge of its value at the time of the rupture itself, recourse must be had to auscultation. Finally, whatever may be the child's position, we should, contrary to the opinion of certain authors, abstain from introducing the fingers into the lower part of the vagina, or making pressure on the perineum and coccyx; in a word, from performing what they call their *little labour*. There are, however, a few measures which may be useful; for instance, when the genital parts exhibit great rigidity, heat, and dryness, the emollient injections, or frictions with mild ointments, such as cerate, or *pommade de con-*

* Mayer has observed respiratory movements in embryos, even within the ovum, as soon as he compressed the cord.

combe, emollient fumigations, or bathing in lukewarm water may be very advantageous. This last remedy especially is of marked utility where the abdomen is tender and painful, and the cervix uteri is rigid and resistant.

ARTICLE II.

REGIMENT OF THE WOMAN IN CHILDBIRTH.

Those women whose labours are usually short, need not, as a general rule, take any nourishment whatever; but when the travail drags along, it is necessary to sustain their strength by articles of easy digestion: thus, as many are in the habit of taking coffee with milk every morning, this may be allowed them without danger; and then, during the day, a few cupfuls of some broth may be given, though always in small quantities at a time. Where the stomach is disordered and vomiting takes place, as very frequently happens, even these liquid aliments will have to be restricted. This plan, however, is not applicable in all cases, since some must be allowed what we should refuse to others; for example, there is no necessity for subjecting robust country women to the same severity of regimen as the delicate ladies of large cities. The choice of drinks is also a matter of some importance, and we may recommend some pure or sugared water, or a weak infusion of lime, or orange leaves, of mallows, violets, etc. Lemonade, or wine diluted with water, will be very agreeable to most women at first; but in general, they soon produce a sour stomach and eructations; all hot cordials and fermented liquors should be positively prohibited. In the country districts, there is often much difficulty in overcoming the vulgar prejudices on this subject; but the physician must insist upon it, for he ought never to lose sight of the distress and agitation that follow the administration of spirituous beverages, and which expose the patient to inflammations and active hemorrhages. Should it happen that her feeble condition requires any restoratives, then some good broth, or a little old wine, or a few spoonfuls of Sherry wine are the only and the best means that can be employed.

The excretion of the fecal matters always demands attention, since pregnant women are most usually constive, especially in the latter periods of their gestation; and it often happens that, at the time when labour comes on, they have not had a passage for several days. The feces accumulate in the rectum and obstruct the head's passage in the excavation; besides, the pressure the distended intestine is then subjected to, is an occasional cause of inflammation of the gut, and facilitates the development of hemorrhoidal tumors. In the last stages of the labour, these matters are pressed on by the child's head, and the violent bearing-down then made by the woman occasions their involuntary expulsion; whereby the accoucheur's hand, which supports the perineum, is soiled, and the patient, who is aware of the circumstance, is greatly mortified.

These dangers and little annoyances ought, therefore, to be prevented, by taking the precaution to administer an injection early in the travail, so as to empty the bowel.

The accumulation of urine in the bladder ought likewise to be prevented, by persuading the patient to urinate in the very commencement of her parturition; for, where she has not observed this precaution, or the physician arrives too late to insist upon it, the emission of water becomes more and more difficult, and sometimes quite impossible, owing to the compression which the head, engaged at the superior strait, makes on the neck of the bladder. In such cases, he should endeavor to push the head up somewhat by two fingers, so that she can urinate; and, if this does not succeed, the catheter must be resorted to. We have elsewhere stated that it was advisable, under such circumstances, to use a male catheter, the curvature of which is greater: though, even by taking this precaution, a considerable resistance is occasionally met with in the introduction of the sound; this condition requires the most careful manipulation, and the woman must lie flat on her back; and then, while with one hand the womb is pressed backwards from the strait, the other introduces the instrument into the urethra.

The accumulation of urine is attended with such grave consequences as to warrant a perseverance in its use. Thus, the least of all the accidents which may result therefrom, is a relaxation, or even the total cessation of the pains; for the distressing sensation caused by a distension of this organ, which is increased when the abdominal muscles contract, induces the woman to suspend the contractions as much as possible; besides which, this pain itself is sometimes so acute as to paralyze, as it were, the action of these muscles; and again, as they are separated from the uterine walls by the mass of urine shut up in the bladder, their action is only transmitted to the womb in a very feeble manner. The paralysis of the bladder, so often met with after labour, is a common consequence of prolonged retention of the urine; and, finally, the walls of this reservoir are occasionally ruptured just at the moment when the woman gives way to the most violent bearing-down. Doubtless this last accident is rare, but still it is not without example, since Ramsbotham, Sr., has observed two cases of the kind. (*Obs. Pract.*, cases 89, 90.)* The tumor thus formed by the over-distended organ, may easily be recognized, more particularly after the rupture of the membranes, by the soft, fluctuating tumefaction detected immediately above the pubis, extending at times nearly as high as the umbilicus, at the side of, and behind which, the hard resistant mass

* The symptoms of this accident are very similar to those of a rupture of the womb, excepting that the child remains *in situ*. There is, besides, a sudden and sharp pain in the vesical region, and the patient complains of the sensation caused by the effusion of the liquid into the abdominal cavity, syncope, etc. The signs peculiar to the vesical rupture, are the sinking in and disappearance of the tumor previously formed by the bladder (which could be felt above the pubis), and an obscure fluctuation in the belly.

constituted by the uterus can be distinguished, whose consistence varies according to whether the examination is made during or after a pain.

ARTICLE III.

OF THE ATTENTIONS TO THE WOMAN IMMEDIATELY AFTER THE LABOUR.

After the delivery, the accoucheur should ascertain, both by the external examination, and the vaginal touch, whether the placenta has drawn down or inverted the fundus of the womb, for the purpose of rectifying it at once if such an accident has occurred ; and, if everything proves to be in its natural condition, frictions with the hand are to be made over the hypogastric region from time to time, in order to excite the retraction of the uterus, and thus favor its disengorgement, and the expulsion of the coagula which may be still contained there. The patient is allowed to remain for some minutes on the little bed where she was delivered, so as to give her a little repose, as well as time to the uterus and vagina to clear themselves of the blood, which flows at first in abundance, and would soil the linen in which she is about to be enveloped. Besides, a few minutes are ordinarily devoted to paying those necessary attentions to the infant, hereafter pointed out. In fact, she might remain upon the same bed a still longer period, where the accouchement has either been preceded or followed by syncope, hemorrhage, or any other accident, or even where there is reason to fear something of this nature, taking care, however, to substitute dry things for those that have been soiled. She ought to lie perfectly flat, the thighs stretched out alongside of each other, lightly covered, and be left in silence, and the most absolute rest both of body and mind. In about half an hour, the patient will again require special attention; that is, the genital organs, and upper part of the thighs, are to be first washed carefully and gently with lukewarm water, pure or mixed with a little wine; then they are to be wiped with warm and well-dried towels, and all the garments worn during parturition that have been soiled by the perspiration, discharges, and fecal matters, are removed, and replaced by others previously well dried and warmed; their shape is unimportant, the only point requisite is to have them large enough not to incommodate the woman in any way, and to admit of being changed easily and promptly. The greatest celerity is to be used in this toilet, lest she should be long exposed to the air; the arms and breast particularly ought to be well clothed, so that the patient may, during the day at least, keep them out of bed without danger of taking cold.

All these preparations being completed, she is next to be transferred to the bed intended for her reception during the lying-in. Many females, finding themselves well enough, want to walk across to the permanent bed; but, against such an imprudence, the physician must interpose the whole weight of his authority. The one to

which she is to be transported must be previously warmed, and provided with a sufficient amount of covering that can easily be changed; though the coverlets should not be thicker or more numerous than those used before pregnancy.

There is a custom much in vogue of surrounding the belly with a moderately tightened bandage; and the women, for the most part, attach the highest importance to this measure as a preservative against the wrinkles and folds that are found after labour on the skin of the abdomen, as also to prevent this latter from remaining too voluminous. Their desires may be yielded to the more willingly, as such a bandage, when moderately drawn, supplies the pressure no longer made by the abdominal walls, and thereby prevents the afflux and stasis of the fluids, the engorgement of the uterine walls, and the dilatation of the cavity of this viscus; and it has the further advantage of obviating the tendency to syncope, and of diminishing the after-pains. But, in order to obtain all these benefits, it should be large enough to compress the whole sub-umbilical region equally, and to prevent its becoming doubled up, whereby a circular cord is formed, which, from opposing the ready return of the liquids, would then prove a cause of hemorrhage.

Some women, carried away by a feeling of coquetry, also desire to compress their mammae by means of a bandage, with a view of preventing their enlargement, and their consequent softness and flaccidity, and some even go so far as to apply topical astringents for the purpose of obviating an over-abundant secretion of milk; but such measures should be proscribed in the most absolute manner, since they might prove very dangerous. These organs only require a sufficient amount of covering to protect them from the contact of the external air, and to maintain a proper degree of heat.

Before proceeding to the consideration of the proper measures for regulating the lying-in woman, it seems indispensable to first point out the principal phenomena that take place after delivery, as the importance of the hygienic precepts we are about to lay down will then be much better understood.

ARTICLE IV.

OF THE PHENOMENA APPERTAINING TO THE LYING-IN STATE.

This term is applied to the period immediately following the accouchement, during which the uterus and genital organs, and indeed the whole economy, gradually return to their ordinary condition.

The attendant phenomena may be divided into the natural and the unnatural, or morbid, including under the latter head all the diseases to which the lying-in woman is exposed; but the former only claim our attention here.

A feeling of depression, or lassitude, such as that experienced after an unusual or an immoderate exercise, succeeds the agitation caused by the labour; and it not unfrequently happens that the

patient has scarcely reached her bed, when she is attacked by a chill, severe enough at times to produce a chattering of the teeth; but this soon passes off, the pulse increases in strength, the heat of the surface returns, the skin becomes humid, a salutary moisture appears, and the various functions are re-established, while the most perfect calm and the most delightful slumber replace the past disorder. Now, although this slumber of the patient is to be respected, nevertheless it is desirable that it should not last more than a few hours after the delivery, or rather that the physician should attentively watch over the state of the circulation, and the condition of her womb during this recuperative repose, because some women have been attacked when in this state with internal discharges, and have only awakened exhausted by the loss of blood; and though, as certain authors advise, perhaps he should not prevent her from sleeping, on account of the rarity of this accident, still he ought certainly to look after her during this period.

After the first nap is over, she might set up in bed a few moments to take a little broth, as this position refreshes her, and also facilitates the escape of the lochia that had accumulated in the vagina. The pulse, which was frequent and contracted immediately after the delivery, now becomes soft and developed, though the blood still retains, for a certain time, the qualities peculiar to the state of gestation; as, for instance, that which is lost at the time of parturition, or shortly afterwards, forms a firm and solid coagulum. The patient is the more enfeebled as the loss of blood has been greater, or the duration of the labour prolonged.

The nervous susceptibility is also highly exalted, and the skin, whose activity was diminished during gestation, now regains a more exalted vitality; it is soft, humid, and is always covered with a dewy perspiration during the first week; this sweat is sometimes very abundant, particularly when she is too warmly covered, and it is not at all unusual to find it followed by a miliary eruption and a distressing pricking sensation. Such eruptions were exceedingly frequent in former times, when it was thought useful to *push the skin* as it was called, and to make the woman perspire by surrounding her with thick coverlets; but now, on the contrary, they are quite rare, and, where they do show themselves, are easily made to disappear by taking the necessary precautions to diminish the cutaneous secretion.

In general, the secretion and excretion of urine do not present anything peculiar; occasionally, however, its emission is obstructed by the swelling of the meatus urinarius, or the bladder is momentarily paralyzed by the prolonged labour, and the excessive compression it has undergone, and the catheter must then be resorted to; and hence, it is always necessary to inquire whether the patient urinates freely and easily during the first two or three days; indeed, Prof. Dubois never fails to make such inquiries, for an accumulation of water in the benumbed and half paralyzed bladder would often account for the uneasiness and suffering that could not otherwise be explained.

The constipation, that is so common during the last stages of

gestation, oftentimes still persists after the delivery for four, six, or even eight days ; and this prolonged retention of the fecal matters may give rise to anxiety, headache, loss of sleep, and sometimes even to a feeling of weight, or actual pain in one of the iliac fossæ; all which symptoms disappear like magic upon the administration of some mild laxative. Where the costiveness continues, a state of suffering very frequently results, which may occasion a slight febrile movement ; and the frequency of pulse, thus produced, coinciding with the pain caused by an unusual retention of the fecal matters, which pain is most commonly located in some part of the hypogastric region, and is augmented by pressure, may give rise to suspicions of a peritoneal inflammation that really does not exist ; and I have known this error to be committed where the pain and fever that had resisted the application of leeches, rapidly disappeared after the exhibition of a purgative. The retention of the feces may also result from a paralysis of the rectum, which paralysis is itself a consequence of the pressure made upon it by the head during its prolonged sojourn in the excavation. I have known, says M. Martin of Lyons, those matters to be retained more than twenty days after a laborious delivery, and to accumulate in such large quantities, and acquire such a firm consistence as to equal the size of a child's head at term ; and, as all the usual laxatives failed, I was obliged to introduce a scoop, and bring these hardened matters away piecemeal ; but even then the gut did not at once regain its functions, though a fresh accumulation was prevented by the use of irritant injections, and the contractility of the intestine was not perfectly re-established until twenty-nine days afterwards, at which period the patient left the hospital. (*Comptes Rendus*, p. 32.)

Let us now study the important modifications that take place in the genital organs, as they gradually tend towards a return to their primitive state. There is then a rhythmical contraction established in the womb, that is, an alternation of expression and retraction, until the latter finally reaches the point where it ceases altogether : thus, if we examine the relaxed walls of the abdomen immediately after the child's birth, the uterus will be found constituting a tumor above the pubis, about ten inches in length by seven in breadth ; but in the course of a few days, this length diminishes to six inches ; and though in thin women, particularly those who have often had children, the womb still remains at the end of two weeks about two fingers' breadth above the pubis, yet the fundus in primiparæ, more especially in such as are at all inclined to embonpoint, cannot be distinctly felt after a week ; and by the end of the sixth week this organ has nearly regained its primitive condition, being still, perhaps, a little larger, and more relaxed than usual. However, the diminution in its volume is not always thus regularly graduated, for it will be seen hereafter that, where the contractility of the tissue is feeble after the accouchement, the uterine walls often retain a considerable thickness for four or five days, the fundus being found all this time close up to the umbilicus. Again it happens that, after having been diminished, its volume augments anew, for some hours,

at times, even for a day or two, and then soon returns to its former size. I can only explain this circumstance by supposing some local congestion, which has not been acute enough to produce an active hemorrhage, but its action has been limited to distending and engorging the uterine vessels, and consequently to increasing the thickness of the walls; or this abnormal volume may be owing, in certain cases, to the presence of coagula of new formation. But, however that may be, I felt bound to point out these anomalies, to prevent the inexperienced practitioner from falling into an error. It often happens that the internal surface of the uterus remains covered by a portion of the *caduca*, and just at the point where the placenta was attached it is found to be very irregular, slightly raised, and of a deeper color than elsewhere; and these inequalities, which have been regarded by some anatomists as tufts destined to dip down between the cotyledons of the placenta, merely depend, according to Desormeaux, upon the excessive distension which the arteries and veins, the last, especially, have undergone during pregnancy, and upon the slowness of their subsequent retraction; though, agreeably to Velpeau, they are owing, in women that die shortly after delivery, to the swelled and fungous character of that portion of the internal uterine surface which corresponded to the placenta. We prefer the following explanation, given by M. Jacquemier, viz., the internal muscular layer of the womb is perforated in all the space occupied by the after-birth, by a great number of holes, which give a peculiar aspect to this portion of its inner surface, and render it less contractile than at other parts; and consequently, as the organ retracts, it has a tendency to produce a hernia in its cavity, and when it arrives at the final state of repose, a tumor is formed, which is ordinarily larger than the palm of the hand, with a very irregular lacerated surface, spongy as it were in character, and often standing out in considerable relief; and the torn utero-placental vessels are comprised in this mass, which renders them tortuous and nearly inextricable. But whatever the explanation may be, it is highly important, adds M. Jacquemier, to bear this arrangement constantly in mind, for an attentive perusal of several cases of an artificial delivery of the after-birth, has convinced me that, in those instances at least, the tumor formed by the most internal layer of the womb, has been confounded with the debris of the placenta, and hence the medical attendants have endeavored ineffectually, though not without danger, to extract it.

Professor Stoltz has studied the modifications that occur in the neck of the uterus, after the accouchement, with a great deal of care, and we extract the following passage from his excellent thesis on this subject: "As soon as the child is born, the cervix is partly formed anew, but it is soft, short, wide, and irregular, and one or more fingers can easily be made to penetrate it; the internal orifice offers the greatest resistance, as is proved when an attempt is made to introduce the hand into the matrix, for it enters with considerable difficulty, and only when this orifice has been progressively dilated. The latter is sometimes so contracted as to induce inexperienced

persons, who endeavor for the first time to carry the hand up into the womb, to believe they have succeeded, when in fact they have only reached the dilated vagina, where they find a large cavity, but no opening to get any further, and the clots of blood, then collected at the upper part of the vagina and around the cervix, add still more to this confusion."

The internal orifice formed after the expulsion of the child, offers but little resistance; and, consequently, it has scarcely occasion to dilate again for the passage of the placenta, as it yields readily; and when the delivery of the after-birth is effected, the matrix contracts, and the neck becomes longer, and more consistent; although it must again open several times to permit the numerous clots of blood to escape. During the lying-in, it gradually returns to its natural size; sometimes, even it is longer; but it acquires the ordinary disposition more or less, as it regains its proper consistence, and, by the end of the first month, it generally exhibits about the same dimensions as it had prior to gestation; at times, however, it is a little shortened, but the consistence is nearly as firm as usual, although the inferior part has seemed to us rather more softened; and it no longer presents a conical shape, but is more cylindrical, from the fact of the summit's having become larger. As a general rule, the scars on the lips are proportionably more numerous, as the patient has had a greater number of children, and her labour has been more tedious. The transverse fissure is deeper, and more angular; and, in such women, the upper part of the cervix is sometimes larger than the base, though it is much shorter than usual, and at times is divided into two lips that are more or less flat, broad, and unequal, and the anterior of which is longer than the posterior; indeed, in some cases, the latter seems to have been altogether destroyed, while, in others, it is well-marked, and the anterior one is scarcely perceptible. In fact, almost as many varieties exist on this point, as there are different subjects.

The vagina becomes shorter, and the ridges that were effaced during the last stage of labour, gradually but slowly reappear, and the orifice of this canal, and the vulva, also regain their primitive condition. At first, the labia externa, as well as the perineum, are thin and distended, and the posterior part of the vulva's contour is flabby, wrinkled, and projecting outward. Sometimes the epidermis is fretted, at others, actual lacerations are found, which produce a smarting sensation; and as to the fourchette, it is almost inevitably torn in the first labour.

The broad ligaments seem to re-form by the approximation of their two constituent layers, while the round ligaments gradually become shortened and retracted.

The abdominal muscles and integuments, which were at first soft and flabby, and exercised but a very imperfect pressure on the viscera and vessels contained in their cavity, again retract; although this process is very often incomplete in women of a soft fibre, or who have had many children.

This slow and gradual retraction of the uterus takes place, in

some instances, without the least pain, and without the knowledge of the patient; but it more generally becomes intermittent and distressing, and, as the sufferings the women then experience have a great analogy to those of childbirth, they are called the *after-pains*. At the same time, a more or less abundant discharge takes place from the vulva, which consists at first of pure blood, then of blood mixed with a white fluid, and, lastly, of a white sero-purulent liquid; and these discharges have received the name of the *lochia*. Finally, a function altogether new sets in, in the course of the first few days, which may be considered as the complement of the puerperal functions; this is the milk secretion, whose onset is attended by certain general phenomena, which are ordinarily described under the term of the *milk fever*; and we shall therefore have to examine, in turn, these three principal characteristics of the lying-in state.

§ 1. OF THE AFTER-PAINS.

The gripes, or after-pains, are certainly owing to the contraction of the womb; and, to be satisfied on this point, it is only necessary to place the hand over the hypogastric region, when we will ascertain that the uterus becomes harder just at the moment when the patient complains the most. These pains are much more frequent and intense in women who have borne many children, than in primiparæ; as, also, after an easy than after a long and painful labour; and when the matrix encloses some foreign body, such as the coagula, or a portion of the membranes or placenta, than when its cavity is entirely empty. Now, all these differences in character will be readily comprehended, if the reader will only bear in mind that the object of the contractions is to express from the uterine parietes, those liquids which the walls are still engorged with after the delivery, and to expel from its cavity all the foreign substances contained therein; that, in very prompt labours, the organ, from being evacuated too rapidly, does not retract so perfectly as it ought, and the blood is permitted to coagulate and accumulate in its interior, and then the very feeble contractility of its tissue forces out but very imperfectly the fluids remaining in the thickness of the walls.

The pains generally commence soon after the child is born, being at first feeble and distant, then more frequent and painful; and, at the moment of their occurrence, the uterine globe retracts, becomes harder, more resistant, and sometimes even seems to rise up, by resting on the posterior plane of the abdomen, as a *point d'appui*, and projecting in the form of a globular tumor, through the ventral parietes. The escape of the lochia is ordinarily more abundant towards the end of, or just after each pain, and not unfrequently a few small coagula come away from the vulva; but, where the uterus contains a large one, the pains constantly increase in force and frequency, until it is expelled, after which they again diminish. In most cases, they cease during the milk fever, though they may continue on for the first seven or eight days. Sometimes they return after having entirely disappeared, are followed by the discharge of a little blood from the vulva, or the expulsion of a clot, or of a portion of mem-

brane that has remained in the uterus, and then everything returns to its natural condition.

As regards the diagnosis, it is highly important to distinguish the after-pains from those caused by a peritoneal inflammation, but fortunately this is not very difficult; for, however strong the after-pains may be, they are generally intermittent, and are separated by an interval of variable duration; besides, the distress attendant upon them is rather alleviated than augmented by pressure, and a more abundant lochial discharge accompanies or follows them; but, while they last, there is an absence of febrile movement; finally, when the child seizes the teat, especially if the latter is the seat of any ulceration, the agony thereby caused, most frequently brings on an after-pain, and this circumstance alone has often sufficed to make them reappear, even after a suspension of several hours. When existing, these differential characters are quite sufficient to distinguish them, but unhappily they are not always so well marked; for, where they are very acute, or follow each other in rapid succession, they are accompanied by fever, and sharp pains in the hypogastrium. But, even then, there is always a remission, which, conjoined with the absence of the other signs of peritoneal inflammation, may aid in determining their character.

Doctor Dewees states that he had several times an opportunity of observing a singular pain which was manifested almost immediately after the delivery, and yet was altogether different from the ordinary after-pains; for he says, "This is a very acute sensation, referred by the patients to the lower part of the sacrum and coccyx. It commences as soon as the child is born, and continues without interruption, and of a frightful intensity. It is declared by the patient to be vastly more insupportable than the pains of labour; for it is as intense as unceasing, but may easily be distinguished from them." Camphor and opium appeared to him the most successful remedies in relieving it.

§ 2. OF THE LOCHIA.

Of all the various excretions that take place after the accouchement, the lochia are certainly the most interesting to us as practitioners, as this is the term applied to those matters that escape from the vulva during all the period from the delivery of the after-birth, until the womb has ultimately regained its normal size and consistence. The order in which these discharges appear, has been very accurately described by Desormeaux, as follows: Immediately after the delivery of the placenta, and the escape of the accompanying blood, all further sanguineous discharge becomes temporarily suspended, probably because the blood that transudes from the surface of the womb accumulates in the cavity of that organ; but the pure fluid soon begins to flow again, although, in the course of twelve or fifteen hours, it loses its consistence, and its color becomes lighter, and then, after a short time, it is changed into a bloody serosity. When the milk fever comes on, which is usually in about forty-eight hours after the parturition, the flow of the lochia is either diminished

or else is entirely suspended; but when it is over, the lochia reappear, and continue during the four or five succeeding days, still containing here and there some bloody streaks, or perhaps are slightly tinged by the blood, the quantity of which diminishes every day, and it usually disappears altogether about the sixth day; the lochia being thenceforth composed of a more consistent yellowish-white liquid, and they thus continue for two or three weeks or a month; though in some women, who do not nurse, they do not pass off until the menses reappear, that is, in about six weeks or two months after the delivery.

These discharges have been divided, according to their color, into the *sanguinolent*, the *serous*, and the *milky, puriform*, or *purulent* lochia; thus, as the uterus retracts, its walls disgorge the fluids they had imbibed by degrees, which naturally run towards its central cavity, and so long as the large venous canals in its substance are not empty, the discharge consists of pure blood; somewhat later, it is composed of serum, which combines with the detritus of the ovum and the mucosities of the organ; and still later, a true suppurative irritation is established, the products of which, analogous in some respects to the non-contagious discharges of the urethra, constitute, in a great measure, the white or the purulent issue.

The lochia have a peculiar odor, called *gravis odor puerperii*, which varies in strength according to the individual and her habits of cleanliness; and to this is also added the scent from the perspiration and the milk, which latter, distilling from the breast, drop by drop, is imbibed by her garments and turns sour. Sometimes these discharges even become fetid, and where this circumstance is not owing to slovenliness, it is always an unfavorable sign, since it most generally announces that the coagula or some other foreign substances are putrefying in the uterus; and where the lochial fluid has the color of coffee-grounds, and a cadaverous smell, it is almost uniformly an evidence of the existence of an inflammation of the womb or vagina, which has terminated by gangrene. Again, whenever the patient is afflicted with carcinoma uteri, the discharges resemble the washings of flesh, and have a very nauseous smell; and in all such cases the aromatic injections, the infusions of elder or chamomile flowers, for instance, should be made several times a day.

The lochia are also very variable in quantity, though we may state, as a general rule, that the patient soils, during the first few days, eight or ten napkins in the course of the twenty-four hours; but after the milk fever is over, the flow diminishes more and more, its amount being usually proportionate to that of the menstrual evacuation; that is, it is more copious in women who have borne many children, or who make use of an over nourishing or a heating regimen, and in those who do not nurse. The abundance of the sanguinous discharges vary still more; at first, according to the force of retraction the uterine walls were endowed with immediately after or during the delivery of the after-birth; thus, at times, they are very copious, frequently coinciding with a considerable development of the organ; and, in such cases, I have known the matrix to

continue as high up as the umbilicus for several days after the accouchement.

This condition, which Leroux calls the humoral engorgement, depends, in his estimation, on the fact that the vessels and pores of the womb, from being distended with blood, do not become empty as soon as usual, because the contractility of tissue is not then active enough to drive it out ; for the walls of the uterus constitute a true sponge, whose meshes are composed of muscular fibres, and which must retract forcibly so as to squeeze out all the liquids contained in the vessels and vacuities formed by them ; hence, if this contraction is not strong enough, the parietes remain engorged, and preserve an abnormal thickness, which singularly augments the whole volume of the uterus, although its cavity may be entirely effaced. Soon, however, the contractile action of the tissue is aroused, and the muscular fibres forcibly compress and flatten the vessels that ramify between them, and thus force the liquids which had hitherto remained there to run out into the cavity of the organ, whence they flow towards the exterior in considerable quantities ; and this discharge might very readily be mistaken for a flooding, occasioned by a retention of some part of the after-birth, or of voluminous coagula, the more especially as it is accompanied at times by sharp after-pains ; but if one finger can then be introduced into the uterus, the accoucheur will ascertain that it contains no foreign substance, and by placing the other hand at the same time on the hypogastric region, he will easily satisfy himself that the organ's unusual size depends only on the engorgement of its walls. In these cases, there is nothing to be done, as the sanguineous discharge is itself the best remedy ; for it slowly empties the uterine texture, diminishes the after-pains, and the womb gradually returns to its normal size. Indeed, we can readily understand that from this sluggishness of the uterine fibres, this defect of reaction, as Leroux called it, to a more or less perfect inertia of the womb there is but a single step, and that a hemorrhage might even result from this absence of contraction, if it were carried to the extent of relaxation.

In some instances, the sanguineous lochia are prolonged far beyond the usual term ; while, in others, they reappear at various intervals, though this latter circumstance is ordinarily owing to some error in regimen, more especially to getting up too soon ; and, therefore, the best plan is to persuade the patient to remain in bed. In the course of a short time the lochia cease their continual flow, and intervals of several hours in duration are observed at first, then of a day and sometimes of two days. Again, nursing the child diminishes both their duration and quantity, and, in certain women, they only last for a few hours (Van Swieten) ; while in others they do not appear at all. (Millot.) They were replaced by an hematemesis in a lady referred to by Velpau, as having occurred in the practice of M. Bruckmann.

§ 3. OF THE MILK FEVER.

One of the most important phenomena appertaining to the lying-

in state, is that usually designated under the name of *the milk fever*. It has already been seen, when studying the modifications impressed on the whole organism by gestation, that the breasts in most women, and even in the very commencement of their pregnancy, are apt to become tumefied, the swelling persists, and that sometimes they become the seat of an abundant secretion long before the accouchement, which may ooze out during the latter months of gestation ; and then, after the delivery, they yield on suction a liquid of a yellowish color, and somewhat more consistent than the preceding, which has a sweetish taste, and is called the *colostrum*. It retains those qualities for twenty-four hours ; but it becomes whiter after that period, and then, in the course of forty to sixty hours, the breasts greatly enlarge ; the subcutaneous veins, seen through the skin, are more swollen than during the pregnant state, and the former become manifestly harder. Headache very often accompanies the commencement of this enlargement, as also, at times, though more rarely, slight shiverings, or heat and dryness of the skin, which is succeeded in a few hours by a copious perspiration : there are thirst and loss of appetite ; the tongue is slightly furred ; the pulse, at first small and contracted, soon becomes full, soft, and accelerated ; and the face is flushed and red. During this febrile movement, which is generally slight, though in certain cases the symptoms may acquire a great degree of intensity, the enlargement of the mammae continually increases, and extends as far as the arm-pits, and the surrounding cellular tissue is involved, whence the patient can no longer bring the arms down alongside of her body, and therefore has to hold them off ; the skin is sometimes so stretched that it becomes painful, and incommodes the inspiratory movements of the chest ; and lastly, as elsewhere stated, the discharge of the lochia either disappears altogether, or else is greatly diminished. This fever lasts for twelve, twenty-four, thirty-six, or possibly forty-eight hours ; and then it is followed by a calm ; at times, however, it is continued for three or four days ; but, in such cases, it very frequently exhibits a marked intermission. The writers have remarked, that primiparæ have less fever than others, and the same is true of those women who commence nursing their children shortly after labour ; indeed, in the latter, it is not at all unusual for it to fail altogether. Again, there are patients, even among those who do not suckle, that have no milk fever whatever, their breasts swell up but very little, and perhaps not at all ; no secretion of milk takes place, and it really would seem, as Prof. P. Dubois has remarked, that nature has left her work unfinished in them ; that, being capable of becoming mothers, and able during the whole term of gestation to furnish the necessary materials for the child's nutrition, yet their organization is absolutely inadequate to supply its wants after birth.

The milk fever generally manifests itself about forty-eight hours subsequent to the delivery ; at times a little sooner, at others somewhat later ; thus, I have seen two patients at *la Clinique* (and all observers record similar facts), who had this fever, the one on the

fifth and the other on the sixth day; and, since that time, I have often had occasion to make the same remark.

Where the child's death takes place at an advanced stage of gestation, and the dead body is not expelled for several days afterwards, it is by no means uncommon to find all the phenomena of milk fever manifesting themselves.

In ordinary cases, by the time the fever is over, the breasts have acquired their highest degree of distension, and the secretion of milk is very abundant; and, if the child draws well, they are emptied and the patient relieved; but, should the mother not suckle her infant, the engorgement continues for a longer period, though it wears away the more promptly as it was less considerable in the first place, or as the milk flows more easily from the teat, and as the perspiration and lochia are the more abundant.

The question, as to the cause of milk fever, has been discussed again and again; but, without entering into all the arguments which this point of doctrine has given rise to, we will merely remark, that the febrile movement (which, however, is not always constant) most probably results as a consequence of the greater activity the mammae then experience, and that it is nothing more than what takes place every time any organ whatever undergoes a very considerable and rapid development.

ARTICLE V.

OF THE NECESSARY ATTENTIONS TO THE LYING-IN WOMAN.

Hygiene.—The patient should be placed in a large, well-aired chamber, which is moderately warm, and free from all strong odors. In summer, the doors and windows are to be opened every day; though, while the air of the apartment is being changed, she ought to be carefully covered, and have the curtains drawn, so as to protect her from any draft; but, at other times, the curtains need not be closed. The room ought to be kept scrupulously neat, and the urine, excrements, and dirty linen should be removed at once. The genital parts must be often bathed with lukewarm water, or some emollient decoction; and these frequent ablutions have the further advantage of calming any inflammation in the parts that have been contused during the labour; milk mixed with a decoction of chervil is the most generally used for this purpose.

The woman requires no exercise during the first few days, and her bed need not be made up until the morning after the milk fever has passed off; for, during all this period, she ought to remain on the one to which she was originally transferred, but, after that, it may be made up every day. Again, it is equally important that the patient should not rise before the ninth day; and, where she is in easy circumstances, and can, without detriment to her interests, abstain for a longer period from her household duties, she should be required to remain in bed for at least two weeks. At this period,

she may be carried to an easy-chair, where she will remain seated for an hour or two, and again, on the following day, for two or three hours. On the third, she might try her strength by making a few turns around the chamber, and then through the apartments; but it would be imprudent to venture out of doors, especially in the winter season, before the fifteenth or twentieth day, and only then in fine weather, and about the middle of the day.

Most women, actuated by a religious feeling, go to church on the occasion of their first going out; and, as these buildings are always cold and damp, they often return with the germs of an inflammatory disease, which, sooner or later, develops itself; and hence, the physician should advise the deferment of this religious ceremony, called the *churching*, to a more distant period.

As regards her diet, the articles ought to be of the mildest character, and of easy digestion; thus, as a general rule, she will only need, during the first day or two, a little porridge two or three times in the course of the day, and some broth during the night; and she should observe an absolute diet pending the duration of the milk fever, for fear of adding to its intensity; though even here, if the general reaction is moderate, she might be allowed some broth. After the fever is over, the quantity of nourishment is gradually augmented; so that, by the twelfth or the fifteenth day, the woman has resumed her ordinary habits. In those who do not nurse, the regimen must be more restricted, especially when the breasts still remain engorged or painful.

Throughout the whole lying-in period, the patient should use some diluted ptisan, moderately sweetened and rendered aromatic, as an ordinary drink; such as a solution of gum, or an infusion of mallows, of violets or linden, the orange or chamomile flowers, etc. etc.; but the acidulated drinks must never be allowed to those who nurse. About the seventh or eighth day, most patients ask their medical attendant for something to *drive away the milk*, which, of course, is generally a useless precaution; but, perhaps, it would be better to yield to a very popular prejudice, so as to escape all subsequent reproach. The canne de Provence, and the infusion of periwinkle, etc., enjoy a high reputation for this purpose; and, as the root of the former is nearly inert, it will, on that account, be preferably employed.

The excitability of the nervous system is such, in lying-in women, that the greatest care should be exercised in keeping away everything that might arouse them, and in avoiding all acute moral emotions.

A temporary constipation, prior to the invasion of the milk fever, is a matter of no consequence; but, should it persist for several days afterwards, injections may be administered either simple, or else rendered slightly laxative by the addition of an ounce, or an ounce and a half of the *miel mercurial*, or a decoction of senna leaves; and, where these measures do not answer, a mild purgative, such as the following, is exhibited by the mouth, viz.: from half an ounce to an ounce of castor oil, rubbed up with an ounce of almond emulsion and

a little lemon syrup ; or the *sal de duobus* (sulphate of potash) might be employed, in the dose of fifteen or thirty grains, dissolved in her usual drinks. The castor oil can be swallowed without much difficulty, when it is diffused in a cup of rich broth, made as hot as the patient can bear it.

The after-pains, just spoken of, are sometimes so intense as to require attention; for, although considered beneficial by most young women, they are so annoying that it would certainly be the part of wisdom to endeavor to prevent them; and we can often succeed in doing this, says Dewees, by taking the following precautions: 1. never to rupture the membranes until the os uteri is fully dilated; 2, not to make any traction on the body after the expulsion of the head, but permitting the uterus to finish the labour; 3, not to attempt the delivery of the placenta until we have insured the complete retraction of the womb; and 4, after the escape of the after-birth, by soliciting or irritating the organ, in order to make its muscular fibres contract as much as possible; all which measures can only act by producing a gradual and complete retraction of the uterine walls, as fast as the parts contained in their cavity are expelled.

When the after-pains are moderate, there is nothing to be done; but, on the contrary, if they have a marked intensity, the physician cannot remain inactive any longer, and he might commence their treatment by applying warm emollient cataplasms over the abdomen and vulva (it being always understood that these are not to be resorted to whenever the patient has had, or is threatened with, a flooding), or narcotized lotions might be rubbed over the belly, or the poultices be sprinkled with laudanum, or, still better, an injection may be administered, consisting of twenty to forty drops of Sydenham's laudanum, diffused in as small a quantity of vehicle as possible. Dewees has derived great advantage from the use of camphor, one drachm of which is rubbed up in a six-ounce mixture, of which a tablespoonful is given every hour; and where the patient finds any difficulty in taking this, he substitutes ten grains of this substance, finely powdered, every hour or two, mixed in a little syrup of any kind. If the pains are accompanied by the phenomena of general plethora, bleeding in the arm should be practiced; and if there is reason to suspect that any large coagula or any part of the membranes still remain in the uterine cavity, one or two fingers are to be carried up into the cervix for the purpose of facilitating their expulsion. Perhaps it is in such cases as this last, that the ergot, which has been so highly extolled by Crozat and Velpeau, has proved successful in relieving the after-pains.

It has already been stated that, in some cases, the sanguineous lochia are kept up far beyond the usual term, thereby greatly enfeebling the patient; but the debility is then only an effect and not the cause which prolongs the discharge; for this latter may be produced by some local irritation, which is itself caused by an obstinate costiveness, and hence clearly indicating the use of laxatives; though in others, it is evidently connected with a general sur-excitation,

which is manifested by heat of surface, fullness of pulse, and other febrile movements, more particularly towards evening, and by agitation during sleep; but here, notwithstanding the apparent feebleness of the patient, we must carefully avoid resorting to the various tonics, which are unfortunately too often employed, but rather, on the contrary, to adopt a moderate antiphlogistic course, such as general bleeding from the arm to a small amount, the use of mild laxatives, and a regulated vegetable diet, proscribing, at the same time, all exciting or even tonic drinks; and it is not until after this general irritation is relieved, that we are to attempt to resuscitate the patient's strength by the adoption of the appropriate means. In some rare cases, however, this unusual abundance and persistence of the sanguineous flow seem to be kept up by her universal debility, and then the absence of the general phenomena just spoken of will authorize a recurrence to tonic medication at once.

The white or purulent lochia occasionally become very abundant, and acquire, at the same time, an excessively disagreeable odor. The discharge is no longer tinged with blood, but it appears more like reddish water, escaping in large quantities, and at times even by jets. These waters are oftentimes so acrid as to irritate and inflame the parts with which they come in contact, and the woman is nearly always so much exhausted by them, that her general condition evidently demands the employment of tonic remedies. The irritated organs ought to be frequently bathed with lukewarm water; and injections of chamomile tea, at first uncombined, but afterwards rendered a little more astringent, must be thrown into the vagina five or six times a day; in some instances, we may also add a few spoonfuls of chloride of sodium with decided advantage. My friend Doctor Casaubon, informs me that he has met with several cases of this nature.

The premature suppression of the lochia is only to be considered as an unfavorable sign when it seems to be connected with the development of some grave inflammatory affection, or when it is replaced, as in the instance above cited, by a supplementary hemorrhage, and then it demands immediate attention; but in the contrary case it need occasion no alarm, for it is merely an evidence of a rapid and forcible retraction of the uterine walls, which is one of the most favorable conditions that could happen.

The secretion of milk, in those women who do not suckle their children, may also prove a source of danger, which should either be prevented or combated; and everything that might contribute towards augmenting its amount, such as a too succulent diet or unnecessary articles of drink, ought to be carefully avoided, and a soft and warm napkin, or even some fine tow, or, still better, a little wadding, is to be applied over the breasts, and renewed as soon as it becomes moistened by the discharge; for such measures excite the perspiration and maintain the heat of the part; then, if the milk gradually leaves these organs, the remainder of the process should be left to nature, but if the teats still swell up we must endeavor to facilitate the discharge from the nipples by the aid of

emollient cataplasms, or by suction; and should these prove insufficient we must resort to the narcotized lotions for relieving the pains, and to the employment of sudorifics and purgatives as revulsives. Among the most common diaphoretics used for this purpose, we may enumerate weak tea, an infusion of pellitory, of bugloss, etc.; and the purgatives are the same as those indicated in a former paragraph. Of the medicines which have been extolled as *lactifuge*, says Desormeaux, Weiss' whey* is the only one that still remains in use; although I have known, continues the same author, a lady employ an ammoniated liniment with entire success. According to Nenter, it is ascertained, by experience, that cups applied between the shoulders diminish the quantity of milk; and Van Swieten declared that he had known the flow of milk to yield when an ounce or two of a strong infusion of sage was administered every three hours.

Most women think it necessary to be purged towards the end of their lying-in; and though, when the physician discovers any positive counter indication to the administration of even a mild purgative, he doubtless should not yield to their desires; yet, under ordinary circumstances, he ought to purge them slightly, both on account of his own reputation and to avoid subsequent unjust reproaches; indeed, this will become necessary, if the tongue is broad, furred, and yellowish, or greenish, the mouth bitter and clammy, and there is a loss of appetite. The Seidlitz waters and castor oil are perhaps preferable, from their mildness and certainty of operation.

CHAPTER V.

OF THE ATTENTIONS TO THE CHILD IMMEDIATELY AFTER ITS BIRTH.

THE management of the new-born infant necessarily varies according to whether it is strong, vigorous, and healthy; or whether, on the other hand, it is born in a state of debility or disease.

* Weiss' whey, made in the following manner, has a high reputation in France: it acts as a mild purgative.

R.—Galium verum (<i>yellow ladies' bed-straw</i>),	{	aa 3j;
Sambucus (<i>elder-flowers</i>),		
Hypericum (<i>St. John's wort</i>),		
Tilleul flowers,		
Sennæ, Soda sulph.,		

The whole of which are to be infused in one pound of boiling whey, obtained by the use of rennet.—*Translator.*

ARTICLE I.

OF THE CHILD IN A HEALTHY STATE.

When the child escapes from its mother's womb living, and in a healthy state, the circulation existing between it and the placenta is observed to continue for some time, where the delivery is abandoned entirely to the powers of nature ; the after-birth is soon detached and expelled, and then it as well as the cord loses its vitality, the circulation becomes weaker and weaker, and the pulsations in the arteries gradually cease, commencing at their placental extremity ; and some authors have advised this event to be waited for before cutting the cord ; but as this spontaneous delivery most generally requires a long time, it is customary to make the section immediately after its birth, and then the following attentions to the new being become necessary, namely : where the infant is entirely clear of the mother's parts, the cord is disengaged if it had been twisted around its neck or body, and the child is placed on the side, having its face turned away from the vulva, so that it may breathe freely without running the risk of being suffocated by the liquids that escape from the vagina. We next cut the umbilical cord at about five or six fingers' breadth from the abdomen, generally using the scissors for this operation, though it may be done with any cutting instrument whatever ; and, as soon as the section is effected, the cut extremity is slightly pinched between the thumb and forefinger, while the remaining three fingers grasp the breech, and the other hand is placed under the shoulders and neck of the child, which is thus lifted out of the bed, and placed on the nurse's knees prepared for its reception. It may then be examined more at leisure, to ascertain that no loop of intestine exists at the base of the cord, and to permit the latter to bleed if judged advisable, before applying the ligature. A ribbon, eight or ten inches long, may be used for this latter purpose, or a cord consisting of a skein of coarse thread ; but, before applying it, the gut is to be reduced if there is an umbilical hernia, and then it ought to be tied at about two, three, or four inches from the surface of the abdomen ; the only precaution requisite is to avoid placing it around the skin, which is prolonged more or less upon the cord ; for pain, inflammation, and ulceration would thereby result, the subsequent cure of which might be attended with some difficulty. The ligature must be drawn tight enough to obliterate the arteries completely and permanently, without cutting their coats, though if the cord happen to be thick and infiltrated, the ligature will strangle its vessels but very imperfectly ; and when it afterwards becomes diminished by the escape or evaporation of the fluid parts, the vessels being no longer compressed, will obviously permit a free discharge of blood from the cut end ; besides, the lymph by putrefying, will soon give off a very fetid smell, and will irritate the skin wherever it comes in contact ; and it is therefore, to prevent such

accidents, that the authors very properly recommend the expression of this viscid fluid by pressing and slipping the cord between the fingers, and even by pricking its enveloping membrane, taking care, however, to avoid wounding its vessels; and lastly, if the cord were unusually large, it might, for greater security, be bent backward after the first knot was tied, and be included in a second one. Where there is reason to suspect a twin pregnancy, it is necessary, after cutting the cord of the first-born, to apply a ligature around its placental extremity also.

Numerous discussions have sprung up as to whether the ligature of the umbilical cord was absolutely indispensable, and, if so, whether it should be applied prior to the section, or whether the cord might be cut before it is tied. Now, although it is highly probable that the circulation in the umbilical vessels would be arrested spontaneously, after the regular establishment of the respiration; as, also, that the ligature is almost or entirely useless in the great majority of cases; yet, if it is certain that a hemorrhage has taken place in some few, even though they be exceptionable instances from the cord having been imperfectly tied, or else not ligated at all; this, of itself, is a sufficient reason for not neglecting so simple a precaution; and as to the second question, the course just pointed out, is in our opinion decidedly preferable.

The surface of the child's body is next to be cleansed of the ceruminous substance that covers it, and from the blood and other matters which become attached at the moment of delivery; but, as this can scarcely be removed by a simple rubbing with dry towels, it should first be diluted with a little oil, or fresh butter, and then be gently wiped off; the yolk of an egg would produce the same effect, and, besides, would render this matter more miscible with water. To get rid of the blood, and other impurities, water mingled with wine, or else a simple bath, into which the child is plunged, is most generally employed; the temperature of the bath should be about twenty-five degrees (77° Fahr.).

The infant being well washed, sponged, and wiped, is next to be dressed; but, before doing so, the physician himself should first envelop the cord in a compress intended for that purpose; which compress is merely a piece of fine linen, of a square shape, and having an opening at its centre large enough to allow the cord to pass through it easily, and then, after having ripped one of its sides from the free margin down to this hole, the root of the cord is lodged at the bottom of the resulting fissure; then the uncut part of this little compress remains below, and the two halves of the divided portion are turned over and crossed in front of the cord, the whole being placed at the upper and left side of the abdomen. A second soft and square compress covers the first, and a band three or four fingers' breadth wide, and long enough to go twice round the body, supports the whole of this little apparatus in its position.

Before enveloping the cord, the dressing of the child had already commenced, its head, arms, and chest, being then covered; and the rest of its clothing should be warm, soft, and moderately tight.

In France, it consists of a camisole, or little woolen jacket, furnished with a soft chemisette that is fastened behind by pins, then one of linen, and another of wool or cotton. But in England, they only surround their children with a long, loose robe, or something like a flannel sack.

Before dressing the child, the physician should ascertain whether it is affected by any vice of conformation; and during the three or four days following its birth, he ought carefully to watch over the excretion of urine and of meconium (for the expulsion of this latter is sometimes delayed for that length of time), and to facilitate it by plunging it into a tepid bath, when he is certain the infant is well formed. The prolonged retention of the meconium is also an indication for the employment of some mild laxative, such as whey, the syrup of violets, the oil of sweet almonds, or manna; the compound syrup of succory is also very generally used, or the compound syrup of rhubarb, either alone, or mixed with sweet almond oil, in the quantity of two drachms or half an ounce in the course of the day; some persons even administer these gentle remedies to all children without distinction, more especially to those that are wet-nursed, for the purpose of supplying, they say, the place of the colostrum, or first maternal milk, whose slightly purgative action clears out the intestinal canal; but the warm water and sugar ordinarily given to the child as nourishment on the first day, is usually quite sufficient to facilitate the expulsion of the meconium, and the viscid fluids that sometimes obstruct the fauces and stomach.

ARTICLE II.

OF THE CHILD IN A FEEBLE, OR DISEASED STATE.

The ordinary attentions to the child, when born in a healthy condition, have just been described; but it not unfrequently happens that the infant, at the moment of its birth, is in a state of great debility, or even of apparent death, which would soon be followed by a real one, if adequate measures were not resorted to at once to prevent it. This apparent death shows itself under two widely different aspects, which have been described by most authors as the apoplexy and the asphyxia of new-born children; though very many English and German accoucheurs have for a long time rejected these denominations, as characterizing but imperfectly the pathological conditions to which they were applied; and M. P. Dubois, in a more recent article, after having remarked that the most constant anatomical character of apoplexy in the adult, is wanting in what has been called the apoplexy of the child, and that wide differences also exist between the symptoms of asphyxia in grown persons, and those of the asphyxiated state of the new-born infant, likewise concludes that the same name has been improperly applied to such dissimilar conditions; and consequently, he, like M. Nægèle, designates that

state of the child in which no sign of life is observed, and none of those of death is recognized, under the title of apparent death.

But while admitting, with the authors just quoted, the imperfection of the terms for designating the true pathological conditions of the foetus, and although conscious that these denominations have no longer, in the latter case, the same sense as when they are applied to the adult; I think, however, that it would prove inconvenient in practice to designate two states under the vague title of apparent death, which in the triple aspect of causes, symptoms, and treatment, present such well-marked differences. Again, M. Dubois says that, notwithstanding its too great generality, this designation is still preferable to the uncertain meaning which must result from the improper employment of the terms apoplexy and asphyxia. It is something, no doubt, we answer, to be aware of the imperfection of certain denominations, but that is not enough, they should be substituted by others which are more explicit.

Now, in carefully examining the symptoms of the child's apparent death, it is found that it is sometimes characterized by a vivid redness of the face and upper part of the body, by a prominence and injection of the ocular globe, and a swelling of the countenance, the skin of which is dotted here and there with bluish spots; while at others, we are struck with the discoloration in the skin, and the flabbiness of the flesh; and assuredly such different physical characters must depend on a difference in the lesions. Whence we may venture to designate the first of these as the apoplectic state, and the second as that of the syncope of the infant, as already proposed by Gardien; since the details about to be given appear to us to justify the adoption of these denominations.

§ 1. OF THE APOPLECTIC STATE.

This particular state of the foetus is most generally the result of asphyxia; and, therefore, all the circumstances that may produce the latter, whether during labour or immediately after the delivery, may be considered as its determining causes; as, for instance, 1. a compression of the umbilical cord between the child's head or trunk, and the walls of the basin. 2. A firm twisting of the cord around the neck, which will at once both obstruct the venous circulation in the brain, and the course of the blood in the umbilical vessels. 3. A premature separation of the placenta, whether attached to the cervix or not; a detachment that always involves the laceration of the utero-placental vessels, and thereby renders the child's hematosis just as impossible as a compression of the cord would. Now, in all these cases, the apoplectic condition clearly results from a suspension of the placental respiration; and the consequent congestion of the capillaries, the brain, and abdominal organs, explain it quite as naturally as the phenomena of asphyxia do in the adult, for in both instances it is the contact of black blood that paralyzes the brain's action.

But this cerebral congestion may also be produced by the compression which the vessels of the neck have to undergo in certain

instances of face delivery, or it may result from the constriction made by the turns of the cord, or even from a sudden and spasmodic retraction of the cervix uteri around the child's neck; for here, likewise, the action of the encephalon is destroyed, the mechanism only being different from the former case; but, whatever may be the source of this compression, the cerebral paralysis necessarily arrests, as Bichat has pointed out, the action of the respiratory muscles, and thus renders the first inspiration altogether impossible, so long as the original cause has not been remedied.

Again, we can readily understand that the accumulation of mucus in the nostrils, mouth, and air-passages, may prevent the introduction of the air after birth into the bronchia, and consequently may produce an asphyxia; the mechanism of death being here absolutely the same as it is in the adult.

The symptoms of the apoplectic state are easily recognized: thus, the surface of the body appears swollen, it is of a violet, or rather of a blackish-blue color, the discoloration being more marked at the upper parts of the trunk, and more particularly on the face than elsewhere, and the turgescence of this latter is still more evident where the cord has been twisted around the neck; in fact, the return of the blood into the jugular veins, is prevented by the constriction which this ligature, as it were, makes about the neck; the muscles do not exhibit any motion; the limbs preserve their flexibility, and the body its heat; and the pulsations of the cord, of the radial artery, and even those of the heart are obscure or insensible; and where a *post-mortem* examination is made, the vessels of the encephalon are found engorged with blood; at times, this fluid is even effused on the surface of the membranes, or into the substance of the brain itself, though most generally, says M. Cruveilhier, the effusion is limited to the surface of the cerebellum; sometimes it covers the posterior lobes of the cerebrum, but it is rarely found in the ventricles of the brain; and, in all the cases examined by him, there was blood enough in the cavity of the vertebral arachnoid membrane to distend the dura mater. Again, those congestions of the liver, that are so common in infants, are then particularly apt to be met with; but, says Billard, they vary considerably as regards the quantity of blood accumulated in the tissue of the organ; for, in some instances, it is found there in such great abundance as to give rise to a sanguineous exudation on the exterior of the organ, the convex surface of which is discolored and moistened by a layer of effused blood, and I have even known an extravasation of this fluid into the abdomen to result from this turgescence; the lungs are also gorged with blood.

From what has now been stated, there is no difficulty in accounting for this condition; and, in order to remedy it, the circulation in the placenta must be freely restored (which is henceforth impossible), or else the pulmonary respiration must be established, so that the blood can traverse the lungs in a sufficient quantity to support existence; but the compression of the brain paralyzes the action of the muscles generally, and those of inspiration are involved in this palsy;

though, so long as there is only a simple congestion of the vessels, this state is of comparatively little consequence; but whenever there is an effusion, more especially if into the substance of the brain, it is mortal. Now, as there is no symptom whatever which points out these differences, we should treat every child just as if there really was some hope of its recovery.

The first indication is to relieve the engorgement of the head and lungs, which is done by promptly cutting the umbilical cord, and allowing a few spoonfuls of blood to escape; when the respiration is most usually established soon after, if there are no mechanical obstacles, such as mucous obstructions in the fauces, to the introduction of the air into the lungs; and, where these do exist, they may be removed by the extremity of the little finger, or with the feathered end of a quill, and the blue and violet color of the surface will then be found to gradually disappear, and give place to a rosy hue at first on the lips, then on the cheeks, and afterwards over the rest of the body. However, in practice, we sometimes find the circulation so enfeebled or benumbed, as it were, that the blood will not run from the umbilical arteries; but its effusion may then be encouraged by plunging the child into a warm bath, or by squeezing the cord several times from its insertion towards the cut extremity; and where this does not prove successful in obtaining blood, it will be necessary to apply a leech behind each ear.

The apoplectic state may be renewed, or, indeed, may be manifested for the first time after the respiration is fully established: thus, I have known it to take place, says Desormeaux, the day after the child's birth, without any appreciable cause, though, in some instances, it is owing to the existence of some obstacle in the pulmonary circulation; for, whenever the infant screams, the face swells up and becomes livid, as do also the hands and feet; the respiration is more feeble and less frequent, and the voice grows weak or dies away; for which it has been recommended to loosen or cut the ligature on the cord; but, as a discharge of blood rarely follows this operation, the application of leeches may prove very beneficial; one or two of them being placed behind the ears, or even, as Kennedy advises, directly over the fontanelles.

§ 2. SYNCOPE OF THE FÆTUS.

In this second variety of apparent death, the child exhibits, says M. Nægèle, a mortal pallor; its limbs are pendent and flabby; the skin is discolored, and is often soiled by the meconium; the lips are pale; the lower jaw hangs down, and the umbilical cord and heart either do not palpitate at all, or but very feebly; though an infant, in this condition, often rouses up at the moment of birth and cries, but it soon falls back again in a state of apparent death. (*Translation by M. Pignè.*)

This variety, to which, like M. Gardien, we give the name of syncope, may depend on two essentially different causes; namely, an excessive debility of the child itself, or a lesion of its nervous centres. Consequently, it is likely to be met with: either where

the infant is naturally delicate, or is born before term; where a hemorrhage, having its origin in the foetal vessels, has occurred during the labour, or at the close of painful or unusually prolonged accouchements; or where the head has undergone any violent compression; or when powerful tractions have been made on the pelvic extremity. There can be no difficulty in understanding why a profuse hemorrhage causes syncope, since the same accident is attended by similar consequences in the adult; but how can the interruption in the cerebral functions, produced by the compression itself, how can it weaken or suspend the movement of the heart, and the action of all the other organs in the child? It may be said that the able experiments of Bichat have clearly proved that grave lesions in the encephalon of the adult, only act on the functions of the heart by previously causing the mechanical and chemical functions of the lung to cease. (*Vide Physiological Researches on Life and Death.*) But, in the foetus, nothing of this kind can take place, since the pulmonary respiration has not yet commenced, being replaced by the placental circulation, which is wholly foreign to the action of the brain; and hence, the default of cerebral action can only make its influence felt consecutively to birth, not by suspending the respiration, as in the adult, but by rendering its first establishment absolutely impossible. Consequently, when the alteration in the brain is not serious enough to be incompatible with the life of other organs, its effect is limited to the muscles of relation; and this explains why the pulsations of the heart are observed to still persist long after birth, and why most authors have advised us, (perhaps without being able to give a satisfactory reason therefor), not to cut the cord, with a view of preserving the foeto-placental relations as long as possible; and, lastly, it accounts for the efficacy of those measures which are calculated to restore the cerebral action.

In cases of syncope, the following are the best means to be employed for its relief: 1. The umbilical cord must not be cut while its arteries are still beating, and the further precaution is to be taken to tie it before making the section; 2. It is very important to keep up the heat of the child's body; for that purpose, wrapping it up in well-warmed blankets, or holding it before a clear fire, or, still better, plunging it into a warm bath containing a certain quantity of wine, brandy, or other liquor; 3. To stimulate the skin by frictions with the hand, or a brush, by dry flannel, or with any irritating liquors, such as vinegar or brandy; M. Moreau strongly recommends, and with some reason, slight percussions to be made with the palmar surface of the fingers upon the shoulders and thighs; 4. It is likewise very often beneficial to produce an irritation of the various mucous surfaces; thus, a little brandy or vinegar is placed in the mouth, or the fumes of burnt paper are blown into the anus, or a feather is dipped into vinegar and then introduced into the nose or fauces; this may be used at the same time to clear away the mucous secretions of the latter, which prevent the inhalation of air; and, where there is reason to suppose that such

secretions have accumulated to a considerable extent in the air passages, the advice of Dewees should be followed, by placing the child on its belly, taking care to elevate the feet higher than the head, and at the same time gently shaking it, so as to clear out the trachea, and thus facilitate the introduction of air; "for," says the American author, "this is a measure of great utility, by which I am every way persuaded that I have preserved the lives of many children" (p. 192). The employment of these various measures is to be persevered in for several hours, for they are not always immediately attended by success; and we must not, therefore, be discouraged too soon, because it sometimes happens that we can only succeed in recalling the infant to life after two or three hours of patient persevering attentions. Lastly, in those cases where all these tentatives have proved useless, and in which we might feel disposed to renounce all hope, we should nevertheless be careful to keep the little infant warm; for, in more than one instance, long-continued heat has of itself been able to revive, so to speak, children that were at first abandoned as dead. Still other measures have been recommended, but they appear less certain in their action than those just indicated, and besides, the requisite instruments for their employment are seldom at hand; I allude to insufflation, to electricity, or galvanism, and tracheotomy.

The first, or insufflation, has been attended with such success that it ought to be resorted to in a desperate case; and it may be performed either by blowing with the mouth directly into the air passages, or by using a female catheter, or, indeed, any canula whatever, passed into the mouth or nostrils; and then, while the air is thus blown in, the hand of an assistant applied on the child's neck moderately depresses the larynx, with a view of flattening down the cesophagus as much as possible. At first, the insufflation is made with great gentleness; and, when the lungs are sufficiently filled to depress the diaphragm and to raise the walls of the chest, as in a natural inspiration, it is suspended, and the abdomen and breast are slightly compressed so as to simulate the movement of expiration, and the process is kept up in this manner for some time. But Desormeaux and Velpeau declare this measure has not proved very satisfactory in their hands; and, as to myself, I have several times employed it without any particular advantage.

Electricity and galvanism are very rarely used, because the instruments necessary for that purpose are scarcely ever at the disposition of the physician; and besides, their happy effects, so much vaunted by certain accoucheurs, need further confirmation to warrant their general use. In all such cases tracheotomy ought to be proscribed.

It has been advised to make use of strong suction on the breasts, for the purpose of dilating the thorax mechanically, "which," says Desormeaux, "although without effect for the proposed object, appears to me admirably calculated to stimulate the muscles that move the sides." But a more powerful remedy, highly extolled by the same author, is a sort of douche made by the mouth directly on the

parietes of the thorax: this douche is performed by taking a mouthful of brandy and blowing it forcibly against the breast; and it is rarely necessary, he remarks, to repeat it many times, for it is found to produce a convulsive contraetion of the inspiratory muscles almost immediately, the blood and air penetrate the lungs, and the respiration is irregularly established, being at first feeble and spasmodie, but soon becoming stronger and more regular.

ARTICLE III.

DEBILITY OF THE FÆTUS.

As the excessive debility of the child may generally be referred to some of the circumstances already pointed out, it should be combated by the same means. In those cases where the infant is only very feeble, because it is born before term, or in consequence of a prolonged sickness on the part of the mother, very great care is requisite to maintain a high degree of temperature by surrounding it with wadding or eotton, and bottles containing hot water, since heat is then the best stimulant.

PART IV.

OF DYSTOCIA, OR PRETERNATURAL AND PAINFUL LABOURS.

ALTHOUGH labour is a natural function, and the resources of the organism are most commonly sufficient for its accomplishment, yet there are a number of circumstances which may interfere with the work of nature, and render this process difficult, dangerous, or even wholly impossible; and it is to the exposition of those difficulties and dangers, and more particularly to the indication of the appropriate measures for preventing or for remedying them, that the fourth part of this work, which we shall arrange in two principal divisions, is consecrated. In the first, we shall point out the accidents that may complicate the accouchement and thereby render the intervention of art imperative; and we shall further study such accidents in their causes, symptoms, prognosis, and therapeutical indications; and, in the second, we shall carefully describe the various operative processes, by the aid of which all those indications may be met; in fact, this last might be designated, without any impropriety, as the *surgery of labour*.

FIRST DIVISION.

OF THE CAUSES OF DYSTOCIA, OR THE CIRCUMSTANCES THAT REQUIRE THE INTERVENTION OF ART.

The causes that render a labour either difficult, impossible, or dangerous, and which therefore require the more or less active interposition of the accoucheur, are numerous, varied, and far from always having the same mode of action; some, indeed, only operate by enfeebling or reducing the forces necessary for the child's expulsion, while others constitute an obstacle to its delivery by exhibiting a disproportion between the dimensions of the pelvic canal and those of the body that must traverse it, thus rendering the most powerful contractions of the womb entirely nugatory. And, on the other hand, when all the conditions are in appearance the most favorable to a natural labour, we may find a number of accidents suddenly

manifesting themselves, which, from their weight and danger, may compromise the lives both of the mother and child.

Consequently, as regards the causes that may thus interfere with the regular process of nature, we may distinguish three different groups of difficult labours, namely: 1. Where they are rendered difficult, impossible, or dangerous by a deficiency or an excess of action in the expulsive forces; 2. Where any obstacle whatever exists which might oppose the easy expulsion of the foetus; and 3. Where the accouchement is complicated by any accident grave enough to compromise the health or life of either the mother or the child.

BOOK I.

OF LABOURS RENDERED DIFFICULT, IMPOSSIBLE, OR DANGEROUS BY A DEFICIENCY OR AN EXCESS OF ACTION IN THE EXPULSIVE FORCES.

IN practice, we meet with numerous cases in which the position is favorable, the organs of the mother and child well formed, and in which none of those grave complications, hereafter spoken of, that have given rise to the title of *preternatural labour*, are met with; and yet, however, the different constituent stages of the accouchement are not accomplished with their ordinary ease or regularity. Now, everything seems so admirably arranged in the works of nature, that the least deviation is sufficient to interfere with their accomplishment; and whether this deviation be dependent on an unusual slowness or an excessive rapidity in the course of the phenomena of parturition, it may equally prove detrimental, either to the mother or her infant, and require the intervention of art just as imperiously as a hemorrhage or a contraction of the pelvis would; and we therefore believe it will prove serviceable to treat, with a little more detail than has hitherto been done, of the causes, and proper measures for preventing the disastrous consequences, that an excessive slowness or a too precipitate progress of the travail may have on both.

CHAPTER I.

OF THE EXCESSIVE SLOWNESS OF THE LABOUR.

IN pointing out, on page 301, what the ordinary duration of the travail was, we were particular to remark that the accouchement

was often prolonged beyond the fixed period, and that a duration of eighteen or twenty hours, in primiparae, especially, could not be regarded as an alarming circumstance; but that, in all cases where more than twenty-four hours have elapsed from the time of its commencement, serious accidents might result therefrom, either to the mother or the child, which should always be prevented by removing immediately the cause of this excessive slowness.

In natural labour, the phenomena occur with such a marked degree of regularity that, as regards the duration, the period of dilatation of the cervix is to that of the expulsion as two or three to one; though it is proper to state that the delay may be manifested during either the first or the second stage, and then, of course, this proportion no longer exists. This distinction, which might serve to establish a classification of the causes that retard the accouchement (if, indeed, they do not make their influence felt in all stages), merits a particular attention with regard to the prognosis; for, although the first stage may be prolonged without danger, the second, on the contrary, cannot pass beyond certain limits without greatly endangering the health of the patient, and oftentimes the life of her child; since it is found that the latter is lost at least one time in four, when the head remains in the excavation longer than seven or eight hours after the complete dilatation of the os uteri, and the rupture of the bag of waters; whilst it nearly always survives when the first period is prolonged even to forty, fifty, or sixty hours and more.* Besides, in the latter case, there are scarcely any symptoms worth mentioning presented by the mother, for the great fatigue caused particularly by the loss of sleep, and, in nervous women, a considerable irritation, depression of spirits, and alarm, are about the only inconveniences that result from it; since the contraction, although feeble, returns at regular intervals, and the labour makes some progress, notwithstanding it is slow. But, when the period of expulsion is extended beyond ten or twelve hours, the pain, as a general rule, is found to become irregular at times, both in its return and intensity; and, although it be sometimes more severe and frequent, it is in reality less efficacious, to such an extent, indeed, that the foetus really seems to be retrograding instead of advancing; in a word, there are uterine pains, but no expulsive contraction.

The local disorder is accompanied, or at least is soon followed, by a violent trembling; the patient has an inclination to vomit, and even throws up bilious matters; she is uneasy, excited, and changes her position every moment; the skin is hot and dry; the pulse runs up to a hundred or a hundred and fifty per minute; the tongue is dry, and it, as well as the teeth, are covered with a dark deposit;

* The following summary, which I take from Churchill, is calculated to confirm the above: thus, in one hundred and thirty-three cases, where the first stage was prolonged from twenty-four to sixty hours, only eight children were lost; in eight that lasted from sixty to a hundred hours, but one died; and in three cases ranging from a hundred to a hundred and seventy-seven hours, not a single death occurred. (*Churchill*, 192.)

the vagina and cervix uteri are hot, and sensitive to the touch, and a yellowish liquid escapes from them, which occasionally has a fetid odor; the pressure of the child's head on the cervix vesicæ prevents the emission of urine; and the parts that line the superior strait and the pelvic excavation, being compressed for a long time by the head, may become inflamed or even gangrenous; which complications may subsequently prove a source of the most serious accidents.

If the woman still remains undelivered, these symptoms augment in intensity in a frightful manner; the vomitings become more frequent, the abdomen tender, the excitability of the patient knows no bounds, the pulse is more and more feeble and frequent, and she falls into a half stupid, or a low, delirious condition, which is soon terminated by death. And it is scarcely necessary to remark that, in the latter case, the life of the child is also more seriously compromised.

We have felt bound to point out these differences in the danger of the symptoms, in order to prove the necessity of the distinction we have made; and we may now proceed to study the divers causes which, at times, retard the course of labour, and also to indicate the means calculated to remedy them, without the necessity of repeating, in each, that the dangers to which they expose the mother and child are much more grave in the second than the first stage of the travail; and that, if in the latter, we may trust longer to the resources of the organism; in the former, on the contrary, the intervention of art is more early necessary.

The causes that may retard the accouchement depend either on the patient's general condition, or on a special modification of the genital organs; though, in both cases, they may manifest themselves, either at the commencement, or only at a subsequent period of the travail; and, consequently, we have to consider it under the three following conditions: 1, where the pains or contractions are slow or feeble in the commencement; 2, where, after having set in with considerable energy, they afterwards relax, diminish, or even cease altogether; and 3, where they exhibit great irregularity in their duration, intensity, and returns; an irregularity that almost wholly destroys their expulsive action. The English writers have applied the term *tedious labour* to all these varieties, and this denomination merits our adoption, for it is well adapted to the cases we are about to describe.

§ 1. OF SLOWNESS OR FEEBLENESS OF THE CONTRACTIONS.

A slowness or feebleness of the contractions may occur at the very commencement of the labour, and persist throughout its whole duration; the pains are quite feeble, the dilatation of the os uteri is effected but very slowly, and the engagement of the head is trifling; and this delay in its progress may be dependent either on the woman's general condition, or on a local disposition of the womb. In the former case, it occurs in women endowed with a delicate or debilitated constitution, or in those accidentally enfeebled by chronic

diseases. Generally speaking, in such instances, we can only encourage her to have patience, and to make use of some light stimulus, such as broth, claret, or a few spoonfuls of sherry wine; in a word, to sustain her strength as much as possible, resorting to the ergot as soon as the cervix is sufficiently dilated, if the uterine contraction is too feeble to effect the engagement and subsequent expulsion of the head. Nevertheless, let it be borne in mind, that a general debility of the muscular system, as we have already remarked, on page 99, has but little influence on the contractile force of the womb, and that it is often quite energetic in very feeble individuals, consumptive ones, for instance. Sometimes, even the accouchement advances more rapidly in such persons, for the trifling resistance then made by the floor of the pelvis, while the uterine fibre still preserves all its contractility, seems to favor the rapidity of its accomplishment.

But in the second case, where the slowness of its progress is to be wholly attributed to a local disposition of the womb, the determining causes ought to be carefully sought after, as they are variable, and require the employment of different means, and hence we learn the importance of a correct diagnosis.

A. An excessive distension of the uterine walls, whether dependent on a dropsy of the amnios or on the presence of several children in the womb, should be placed in the first rank of these causes; for, independently of a considerable enlargement of the belly, and the unusual elevation of the head, towards the end of gestation, or beginning of labour, which is worthy of attention, there is something then altogether peculiar in the character of the pains. In fact, this over-distension renders the uterine walls much thinner than usual, benumbs them in some measure, and diminishes their force of contraction, and consequently the pains, though feeble and only returning at distant and irregular intervals, leave the patient in a state of anxiety and continual suffering; and, if we may judge from her expression, seeming to implicate the fundus alone, without extending lower down, for the amniotic pouch, if still unruptured, scarcely bulges out during their continuance. Under such circumstances, we should carefully avoid resorting to stimulants, which would have no other effect than that of augmenting her sufferings, without rendering the contractions any more energetic; and hence, an artificial rupture of the membranes is here the only remedy, because, by facilitating the discharge of the waters, we relieve the excessive distension of the organ, as well as the continual distress thereby occasioned, and then the genuine pains become more frequent and more severe.

B. The slowness and feebleness of the contractions may likewise depend on a sanguineous engorgement, or plethora, of the uterine tissue, and this condition, when it exists, can be recognized by the following signs; the pains are at first quite energetic, but soon diminish, both in frequency and intensity; the cervix uteri is soft, supple, and non-resistant, but the presenting part does not engage during the pain, which latter is equally diffused over the whole abdo-

men; and, besides, the phenomena of general plethora nearly always manifest themselves at the same time; thus, the respiration is laborious, the pulse hard and full, and the pains are very irregular, both in their force and frequency. Bleeding in the arm, proportioned to the general condition of the patient, is then the best remedy.

c. Or it may be owing to a debility, or an imperfect organization of the uterus itself, though the patient may otherwise be perfectly healthy, that is, the muscular apparatus of the womb may be deficient in contractile force, while the other muscles of the organism are endowed with their usual energy; and hence the dilatation of the os uteri is effected slowly, for, notwithstanding the cervix no longer offers any resistance, the organ appears incapable of determining the expulsion of the foreign body it encloses. In such cases, the ergoted rye is the only article capable of stimulating the enfeebled contractions.

d. Again, according to Baudelocque, the death of the child would have the unfavorable effect of diminishing and enfeebling the uterine contractions; but M. P. Dubois remarks, and very justly, in our opinion, that, if the woman is otherwise healthy, this event has no influence over the progress of her labour; and that, if it sometimes happens that the delivery is more painfully accomplished where the infant has been dead for some time, it is only because the diseases of the mother have been the occasion of such death, and therefore her forces are weakened by the antecedent malady.

e. Finally, a premature rupture of the membranes may have the same effect, in relaxing and weakening the pains, as their more retarded rupture, and the following phenomena may then take place: thus, if the head happens to be very large, and is low down when this occurs, it becomes applied directly in the orifice, and retains a great part of the waters behind it, and if the os uteri is sufficiently dilated to permit the head to engage freely, no water escapes, even during the contraction; but, if the dilatation is still imperfect, the waters leak away drop by drop, as it is said, at the commencement and termination of each pain, which latter is wholly employed in thus gradually driving out the amniotic liquid, without contributing in anywise to the enlargement of the cervix. The same phenomenon is observed when the membranes yield at a higher point of the pouch, one not corresponding at all to the neck of the uterus, for in such cases but little water escapes at the moment of the rupture, and each pain is likewise accompanied or followed by a greater discharge without accelerating the dilatation in the least. However, this circumstance, according to M. P. Dubois, does not merit all the importance usually ascribed to it, since, properly speaking, the travail of expulsion has not commenced, and the foetus, protected by the surrounding liquid, cannot suffer in anywise from the slowness of the labour, and therefore, in most cases of this kind, there is nothing to be done. Though, if the accouchement lingers too long, we might follow the plan generally advised, and introduce two fingers into the cervix uteri, and push up the child's head, for the purpose of promoting a more ready escape of the waters, or, indeed, of lace-

rating the inferior segment of the membranes, if the original rupture had occurred at a much higher point. Nevertheless, this manœuvre is only to be resorted to when the dilatation is already well advanced, for it is evident that, if all the water should escape a long time before the enlargement of the neck, the infant might suffer from the prolonged and direct compression on its body.

§ 2. RELAXATION OR SUSPENSION OF THE PAINS.

It is not at all unusual to find a labour which has heretofore been progressing favorably to become at once arrested, and the pains, which up to that time were strong and frequent, to relax or even disappear altogether; and, of course, the indications which these phenomena present will necessarily vary with the causes that have given rise to them, and therefore the physician ought to search them out with the greatest possible care. Among those which may thus diminish or suspend the pains, the following are usually enumerated, namely:—

A. Any vivid moral impressions operating during the travail, any unexpected news or sharp discussions, the announcement of a child of an unwished-for sex, and the arrival or presence of persons disagreeable to the lying-in woman, may determine a cessation of the pains; and in these cases the removal of the cause is the only remedy. But, unfortunately, it is not always an easy matter to ascertain what that cause may be, and it is left to the prudence and sagacity of the medical attendant to penetrate the mystery and remove the trouble.

B. A pain caused by the coincidence of some malady, either existing antecedent to, or manifested during the travail, such as distressing and repeated vomitings, sharp pains in the muscles of the back and abdomen, gripings in the intestines, etc. etc.; for, in all such instances, the woman, experiencing an intense pain, which is further heightened by the uterine contraction, endeavors to suspend the latter as much as possible, and hence the accoucheur should try to remove the cause which thus interferes with its progress. For instance, where the emesis obstinately persists, he ought, if the patient yet bears opiates well, to administer a few drops of laudanum, and, if not, some aromatic drinks or antispasmodics, accompanied by narcotic lotions over the epigastrium. In case of acute muscular pains, embrocations with an opiated liniment might be practiced over the affected part, or a change of position is sometimes all that is requisite to calm them. If, however, as it often happens, this pain, which is wholly foreign to the uterine contraction, cannot be relieved, then the powers of nature must be assisted by an artificial termination of the labour.

Again, those violent cramps, which are occasionally produced by the pressure of the child's head on the sacral nerves, should certainly be classed among the circumstances that may relax or even suspend the uterine contraction altogether; as occurred in three cases of the kind observed by Professor Meigs, of Philadelphia, where the pain was so violent that it caused the patient the most inexpressible anguish. The women declare this pain is similar to what would be

produced by the pinching or torsion of a large nervous trunk, and they incessantly demand a prompt deliverance, and the physician is often obliged to yield to their entreaties; besides, his intervention may be further necessitated by the more or less perfect suspension of the contractions of the womb; for this organ seems paralyzed by the violence of these nervous pains, and we are often constrained to apply the forceps for the double purpose of relieving the patient from the frightful sufferings that torment her, and of supplying the want of power in the uterine efforts.

c. We have already alluded (page 383) to the unfavorable influence that an extreme distension of the bladder might have over the progress of parturition; and, therefore, if the suspension of the pains could be justly attributed to this circumstance, the catheter should evidently be resorted to at once; but if this operation is rendered impossible by the engagement of the head in the excavation, a recourse should be had to the application of the forceps: for the administration of ergot here would appear to be very imprudent, to say the least.

d. If caused by a general plethora, which is characterized and is easily recognizable by the redness of the face, by headache, throb-bings in the head, vertigo, dimness of vision, tinnitus aurium, agitation, unusual force and fullness of the pulse, and by weariness of the limbs, it must be relieved by general venesection.

e. The debility of the uterus itself is also mentioned as a cause, since there are some women in whom the contractile force of this organ is so easily exhausted that the contractions, after having proved quite sufficient for the earlier steps of the labour, diminish, or disappear all at once, without any other appreciable cause than this feebleness of the womb. In such cases, the patient should be advised to rise up and walk about the chamber for some time, and it is also necessary to rub her abdomen, to titillate the cervix uteri, and to make pressure on the perineum; and then, if all these means fail, to administer the ergot.

The second stage of labour is sometimes effected with an excessive degree of slowness in very fat women; in whom, although the contractions do not cease altogether, yet they appear to be ineffectual, and do not force the child's head to advance; but this impotence of the uterine efforts has appeared to me to be much less dependent on resistances from the lower part of the pelvic canal, than on a default of action in the abdominal muscles; because the thick layer of fat, which virtually doubles the anterior walls of the belly must paralyze, to a certain extent, the synergic action of those muscles, and the uterus will be thus deprived of the aid which they habitually render. The abdominal compression, which is so much extolled as a remedy, would then appear peculiarly applicable; for a circular bandage, applied around the body, would effectually replace the *point d'appui*, which the contracted muscles usually furnish to the womb; besides, as Velpeau observes, this is too innocent a remedy not to be employed before having recourse to the spurred rye, or to an artificial termination of the labour.

§ 3. IRREGULARITY OF THE PAINS.

The contractions may be irregular in their progress, or they may be partial in their operation ; that is, only one portion of the uterine walls contracts, the rest of the organ remaining in a state of inaction ; which irregularity is sufficiently explained by the muscular structure of the womb. In the first variety, the pains are recognized by the following signs : there is not a complete and perfect interval between them, they are continuous, and only interrupted by the paroxysms, during which the intensity of suffering is horrible. In the second variety, the pain returns, it is true, at intervals, but sometimes it is only the fundus, again one of the angles, and at others, some part of the body which contracts spasmodically, whilst the remainder scarcely does so at all ; but, notwithstanding, the pains are no less acute than if the whole organ were involved ; often, indeed, they are more so, though even then they are easily recognized by the fact of occurring almost without effect, or at least without having a decided influence over the progress of parturition. For during the pain, and even at the very moment when the woman suffers the most, we may ascertain, by applying the hand on the hypogastrium, in the case of partial contraction, that the uterine ovoid does not present its normal regularity, and that it exhibits instead various bosses and inequalities ; besides, we can readily assure ourselves, in all cases, that no impulsion is given to the foetus, and that the presenting part does not advance ; as, also, that where the membranes are still unruptured they do not bulge out, nor indeed scarcely become tense during the pain ; true, at the height of the latter, just at the moment of the paroxysm, the presenting part seems, at times, to advance a little ; but this progression does not correspond, on the one hand, with the violence of the pains, and, on the other, it is not kept up, though these last still persist. The patient is then suffering from an extreme agitation, she weeps and becomes despondent, and very often her pulse is frequent, developed, and febrile ; the face red and flushed ; the skin is hot ; the mind confused, and the limbs are convulsively contracted. These irregular contractions, which have been designated under the title of *uterine tetanus*, sometimes disappear of their own accord, though they may be prolonged for an indefinite length of time ; and it is then highly important to remedy them as soon as possible, which is best done by a general bleeding where the woman is plethoric, the pulse full and well developed, and the face red and flushed ; but, as this is not practicable in nervous and very irritable women, we should then resort to tepid baths, emollient injections, and opiated lotions over the abdomen, and more especially, to laudanum, given once or twice as an injection, in the dose of twenty to forty drops, diffused in three to four ounces of some mild vehicle.

Under the influence of these measures, the last, particularly, the pains almost entirely disappear in the course of half an hour or an hour ; during which period the patient generally slumbers, and then the good pains, that is, the natural and regular ones, come on, and the labour terminates happily.

The action of opiates is occasionally much more prompt, being felt in the course of ten minutes or a quarter of an hour after their administration. I witnessed this fact in a young primiparous lady, whose labour commenced at ten o'clock in the morning, and the pains progressed slowly but regularly until four the next morning, when they assumed the peculiar character under consideration; and, from that moment, notwithstanding the almost continuous suffering and permanent contraction of the womb, the head did not descend. At six, I administered opiates; and, in the course of ten minutes, the excessive agitation was calmed, the pains disappeared entirely, then returned again a few minutes after, at first slow and feeble, but soon regular and energetic enough to terminate the accouchement in a short time. When the cervix participates in this state of spasm, the employment of the ointment and extract of belladonna, as we shall have occasion hereafter to point out, will be found decidedly useful; though we ought to mention that the employment of belladonna has been objected to on the ground that it suspends the pains, and paralyzes the exercise of the contractility of tissue after the labour is over; but this is an error, for its action is always limited to the neck, and the latter, at most, may be paralyzed for some time.

In the case before us, M. Velpeau says he has used the following potion with advantage: R.—Lettuce, or wild poppy water, fʒiv; orange-flower, or mint water, fʒj; syrup of white poppies, fʒj; extract of opium, gr. j.

But of all the various means just alluded to as being capable of stimulating the weak, enfeebled, or suspended contractions of the womb, there are but few we have so often recommended as the spurred rye; and the importance of this medicine induces us to devote a particular article to its consideration, in which we shall first study the nature and physical characters of the ergot, and afterwards its therapeutical action.

1. THE NATURAL HISTORY OF ERGOT. (SPURRED RYE. *Secale Cornutum.*)

The spurred rye, which is now used so extensively in medicine, has at all times been considered as an alteration of that grain, the writers on the subject only differing in opinion with respect to the causes of such a change. Some have made it depend on atmospherical or local influences; such as long-continued rains, fogs, and noxious dews, or on too poor or too humid a soil; while others have regarded it as being produced by the puncture of certain insects; and this latter opinion has even yet a great number of advocates, although at the present day it is most generally considered as a fungus. Paulet has classified it among the *clavaria*, and De Candolle among the parasitic fungi, under the name of *sclerotium clavus*, from its form; and this was the generally received opinion, until Dr. Léveillé, in a memoir published in 1826, in the *Annals of the Linnean Society of Paris*, announced that the ergot was in reality an alteration of the grain; and that it was produced by the presence of a parasitic fungus, which he named *sphacelia segetum*, intending

to signify by this title both the color of the diseased grain, and the sad consequences which result from its use when mixed with bread. The extended observations of my "Confrere" have satisfied him that this fungus principally manifests itself in the summer season, after the heavy rains, and that it is developed in the grain itself between the teguments and the perisperm. At first, it is invisible, but it soon increases in size, and breaks through the envelops of the grain, while the perisperm, which was very small and white, assumes a violet hue, then elongates, or grows, and becomes hard and brittle, escaping from between the paleæ (the husk or chaff), and pushing before it the fungus (*sphacelia*) found at its free extremity. This fungus is soft and yellow, of a disagreeable odor and a sweetish taste; being formed of several lobes joined at their centre, its surface exhibits some little undulations, similar to the convolutions of the brain; and, if a particle of it be placed in water, under the microscope, it is found to become partially liquefied, and the water holds in suspension an immense number of little grains, or spores, which are oval, transparent, and exceedingly minute in size. These facts, which my learned friend, Dr. Léveillé, has kindly made me witness, leave no doubt on my mind as to the nature of this affection; and I am satisfied that it is a true fungus, and a perfectly distinct part of the sclerotium clavus. This fungus is rarely met with on the spurred rye found in the shops, as it has probably been detached either by the threshing, or by the friction of the heads against each other. As this product is soft and diffluent, it spreads over the teguments and the spur, where it becomes dried and cracked, and forms a thin layer of a dirty white or yellowish color, which dissolves when thrown into water. Now does the ergot owe its properties to this fungoid portion, or to its own proper substance? Experience has not yet settled the doubts of M. Léveillé on this subject; but as, by the aid of this theory, we can readily explain why the ergoted rye so often proves worthless when administered, we believe the choice of this substance is not an indifferent matter; and, therefore, such grains as have a smooth and brilliant surface, as well as those that exhibit numerous deep fissures, should be rejected, for the one has been deprived of the sphacelated portion by friction, and the other altered by successive rains and heats. The preference should be given to those which still have the fungus on their summits, and the surfaces of which are entire, of a violet color and dirty aspect, and covered, as it were, by powder.

2. THERAPEUTICAL ACTION.

The action of this medicine is too well ascertained at the present time to permit it to be any longer called in question; though we have only to speak of it here in its obstetrical relations.

Ergot is now recommended by accoucheurs for arousing or accelerating the uterine contractions during the travail, and for preventing or remedying the inertia of the womb and the hemorrhage which so often accompanies it, after the delivery. This action is prompt, and is recognizable by the following signs: the uterine contractions are

observed to become more active in the course of ten to fifteen minutes after its administration, more frequent and energetic if they were previously slow or feeble, and reappearing, if before suspended; and we cannot believe, like the authors who proscribed this medicine as useless, that this is merely a simple coincidence, and that the travail would have been restored without its use, for the thousands of instances in which its administration has always been followed by the same uniform result, will not permit us to consider the latter as the mere effect of chance; and, besides, all those who make use of this article, know full well that the contractions which attend the exhibition of ergot have a peculiar character, that cannot be mistaken; for, as soon as its action is felt, they become permanent instead of intermittent, the uterine globe remains hard and contracted, and the pains are continual, though they are marked, it is true, by exacerbations, or paroxysms, and there are moments, as in ordinary labour, when the patient does not appear to suffer at all, and others where she makes loud cries or bearing-down efforts; but the periods of repose are only apparent, for the womb is constantly retracted on the product of conception, since the hand, if applied over the belly, always finds this organ in a remarkable state of hardness; and there is not that regular succession of repose and contraction which is constantly observed when the travail of childbirth is spontaneous; and we may further add, that the patients themselves detect a great difference between the pains excited by the medicine and those previously felt in the same or former labours, and they bear them, as a general rule, more impatiently than the latter, complaining particularly of the want of relaxation. The accouchement is ordinarily terminated in an hour or an hour and a half after the exhibition of the spurred rye; but the action of the latter wears away and soon disappears after this period, and therefore, if there is any necessity for its further use, it must be again renewed, or recourse must be had to the artificial means for terminating the labour.

This remedy is only to be given during parturition, where the pelvis is well formed, the infant presenting by its cephalic or pelvic extremity (and of course when its position is well ascertained), where no serious obstacle exists at the uterine orifice, in the vagina, or at the external parts; that is to say, the cervix uteri is sufficiently dilated, or at least soft, supple, and patulous enough to admit of dilatation, and where the membranes are ruptured. On the other hand, its administration ought to be avoided as much as possible in primiparæ, and, if it should become necessary in them, the perineum must be supported with the greatest care, lest it be exposed to a considerable rupture should the delivery prove rapid; in very irritable women, who may have had convulsions either during gestation, or in their previous labours, because the ergot often produces a state of nervous excitement in such persons, which occasionally amounts almost to delirium; in plethoric patients, suffering from a congestion about the head, which is characterized by flushing and turgescence of the face, by injection of the eyes, headache, etc. etc., in a word, in all those cases where venesection is obviously indicated;

and lastly, in all those women, where the womb, from being endowed with an acute degree of sensibility, is in a state of irritation, and is habitually the seat of pains, or who, in a former labour, might have been affected with an inflammation of this organ.

The spurred rye has likewise been employed successfully in the profuse hemorrhages that follow abortion, which are caused by the retention or tardy separation of the placenta; as also for the floodings that take place after the expulsion of the foetus, whether before, during, or subsequent to the delivery of the after-birth; and we shall take occasion hereafter, in the article on *Hemorrhage*, to refer to its use under such circumstances. The question now arises, can the ergot, which possesses the property of stimulating the enfeebled contractions, and of arousing them when suspended in so high a degree, can it develop them where they have not yet existed? If we might judge from certain experiments made for this purpose, by Professor Dubois, in our presence, at *la Clinique*, in 1837, we should answer this question in the negative;* but it must be confessed that those trials were not numerous enough to enable us to decide it positively; and, besides, although this article has seemed to possess the abortive property in some instances, yet in many others it has proved wholly inefficacious.

Again, it has not been observed that abortions are of more frequent occurrence in those countries where the bread of the inhabitants contains a certain quantity of ergot; but habit, perhaps, might explain its want of action here.

This medicine is employed under divers forms; and the powder, the infusion, the decoction, the aqueous extract, or alcoholic extract, ethereal tincture, or the syrup, may be used, almost indifferently; although in France scarcely any other preparation than the powder, the infusion, or decoction, is ever employed. Thus, it is customary to administer two or three doses of the powder, consisting of eight or ten grains each, diffused, at the time it is given, in two ounces of pure or sugared water, or a little wine and water, or some slightly aromatic infusion; and these doses are repeated at intervals of ten minutes, and if the contraction is manifested after the second dose, as most usually happens, the third need not be given. Some accoucheurs administer it in a small quantity of white wine or tincture of canella, and other excitants; and it has been advised to add a small quantity of opium to prevent the medicine from being rejected, though where the patient either vomits or seems disposed to vomit during the labour, it is better to administer it, as M. Dubois recommends, by injection, and the dose might then be increased a little.

The infusion is prepared by diffusing two scruples of the powdered

* Such also was the opinion, at the time, of the honorable Professor alluded to; but, since then, new experiments have somewhat modified his views; for we have heard him affirm, at the Academy of Medicine (in March, 1840), that, in certain cases, the ergoted rye might bring on the regular pains, and, in consequence, he classified this medicine among the measures calculated to produce a premature artificial delivery. But this opinion does not appear to us to be based on a sufficient number of facts to warrant its general adoption.

ergot in a glass of water for ten minutes; or, if the article is merely bruised without being powdered, three or four scruples may be infused in the same quantity of menstruum. In conclusion, we shall not again repeat what was said in the commencement of this article concerning the physical characters that distinguish good and genuine ergot, but we will only add that the apothecaries ought to be cautioned to have the drug freshly pulverized; and as, notwithstanding our earnest recommendations, they will not all take the proper precautions, the accoucheur would do well to always carry a few grains with him, so as to have it at hand in case of necessity.

CHAPTER II.

OF TOO RAPID LABOURS.

ALTHOUGH these are much more rare than the preceding class, yet the accidents that may result in consequence of too prompt a delivery, are quite as serious as those produced by its excessive slowness; and, therefore, we must endeavor to supply an important omission made by most authors (and ourselves likewise in the first edition of this work), by devoting a few lines to the consideration of the attendant circumstances. Thus, in practice, we occasionally meet with women who have the unfortunate privilege (if it can be called such) of being delivered by the manifestation of only a few pains; and this excessive rapidity in the progress of their labour is apt to be renewed in every subsequent travail; and, what is still more singular, this peculiarity even seems to be hereditary in certain families, in which it is perpetuated for three or four generations.

In such cases, the rapid termination is always to be attributed either to an excess of energy and frequency in the uterine contractions, or to a want of resistance in the walls of the canal which the foetus has to traverse.

Certain writers have attempted to establish a relation between the phenomena that precede or accompany the menstrual discharge in the non-gravid state, and the activity or slowness of the contractions of the womb during the accouchement; for, they say, should the periodical flow be difficult, laborious, and painful, and the patient be tormented every month with violent colicky pains, either before or during her terms, the irritability of the uterus, and the energy of the contractions, will almost invariably be excessive in the hour of childbirth; but, on the contrary, there is reason to anticipate the occurrence of slow and feeble pains, where the woman is only advised of the return of her menses by the appearance of blood, and the latter pass off without suffering. We do not know exactly to what extent this approximation is true; yet we believe the law is far from being without exceptions. But, however this

may be, it is generally found that such very energetic contractions are most likely to be observed in nervous and excitable persons ; "appearing to depend," says Wigand, "upon a high grade of irritability, the source of which, especially in hysterical patients, seems to be centered in the interior, since the moral affections are often found to have a great influence over the progress of labour;" and everybody knows that where an application of the forceps has been seriously proposed to the woman, this of itself has often proved quite sufficient to bring on strong and powerful contractions of the womb, by the fears which the instrument gives rise to, even though they had been languishing before.

In certain eruptive fevers, scarlatina especially, the pains very frequently exhibit this character, and the child is then expelled with an unusual rapidity; but it is difficult to decide whether this circumstance is not rather owing to a want of resistance from the soft parts, which, like all the muscular apparatus, have been enfeebled by the disease. Lastly, this accident is also met with in certain strong, robust, and plethoric women.

In these cases, the uterine contractions are quite strong in the commencement of labour, they are very painful, last for a long time, and are separated by short intervals; and, while the pain lasts, the patient cannot resist the urgent desire to bear down, and forcibly contract all the muscles of her body; she is much more irritable than usual, and there is something peculiar in her attitude; the head is hot; the face red and puffed up; and the pulse full and accelerated. In some instances, the intervals are scarcely perceptible, for one pain has hardly terminated before another begins; sometimes, indeed, the womb seems in a state of permanent contraction, which only passes off after the expulsion of the foetus. The belly is then very hard; the whole body rigid and contracted; the woman holds her breath, seizes hold of some surrounding object, and, making a loud cry or grinding her teeth, she bears down with an incredible force, and drives out the child together with the matters contained in the bladder and rectum.

But, after all, however forcible we may suppose the uterine contractions to be, they will hardly explain the rapidity of the delivery, unless we admit that a default of resistance in the walls of the pelvic canal exists at the same time; and, in this view, should a very large basin, a premature child, or the marked diminution in the normal resistance of the soft parts, so often met with in persons worn out by lingering diseases,* should they, we repeat, be considered as singularly favoring a too early expulsion of the child?

Where the phenomena of parturition take place with due regularity, the infant rarely comes into the world under seven or eight hours after the first pain, and this beneficent delay enables the parts

* This want of resistance from the soft parts may be met with in women who are otherwise healthy, as occurred in a case reported by Dr. Rigby, where a patient, in the enjoyment of good health, was delivered by two pains; the first of which aroused her from a sound sleep, and the second expelled the foetus into her bed.

which the child has to traverse to become prepared for the dilatation they must shortly undergo; the uterine orifice gradually enlarges, the soft parts, that line the excavation and the pelvic floor, being lubricated for a long time by the liquids exhaled from the womb, or secreted by the upper part of the vagina, become more soft and supple and better prepared for the distension they will be subjected to, at the moment when the head is born; besides, their dilatation being effected under the influence of intermittent contractions, alternated by an interval of rest, is slow and gradual, and takes place without causing the patient any very acute suffering and without compromising the life of the child: but it is far different in the case before us, where the over-hasty expulsion of the infant exposes it as well as the mother to grave accidents. And hence, with regard to the circumstances that may complicate the delivery (without speaking of the inertia of the organ, which will be treated of hereafter), we must note the laceration of the perineum, vagina, and vaginal portion of the cervix, so often produced by the foetus' rapid passage through the pelvic canal; the prolapsus of the womb, which, not being yet sufficiently dilated to allow the child to clear its orifice, is forced down beyond the vulvar ring; the serious and sometimes fatal synapses to which the prompt depletion of the womb exposes the patient;* and, lastly, death itself, produced solely from the violence of the nervous shock caused by such pains.

The child is likewise exposed to real danger; for if the membranes are ruptured and the waters entirely discharged early in the labour, it must be apparent that, when the pains become permanent, the umbilical cord might be compressed between the foetal surfaces and the uterine wall, or the infant itself might suffer from the direct pressure it then undergoes; and, on the other hand, if the woman, supposing herself only at the commencement of her travail, should happen to be still standing or walking when surprised by these violent pains, the child may be forcibly expelled, and, striking against the floor, be killed, perhaps, by the severity of the fall; besides which, the umbilical cord is stretched from its placental insertion to the navel, and, if its rupture does not result in consequence, the traction made upon the still adherent after-birth may be sufficiently great to depress, or even to invert the womb completely; though this latter circumstance is an exceedingly rare one. A rupture of the cord has been more often observed, but this is seldom attended with much danger, so far as the child is concerned, because the laceration usually occurs at two or three inches from the navel, and

* There is no difficulty in explaining the production of syncope here, for the womb, being distended by the product of conception, necessarily exercises a greater or less degree of compression on the large abdominal vessels; and when the foetus is slowly delivered, as in a natural labour, this compression diminishes in the same proportion, and the blood returns in a very gradual manner into these great trunks, where its course was before impeded; but in the case before us the depletion of the uterus is sudden, and the vessels are extricated all at once from the strong pressure they previously experienced, the blood flows into them in abundance, and only goes in small quantities to the brain; whence the latter, deprived of its natural stimulus, no longer acts on the heart, etc. etc.

because, by tearing the umbilical vessels, it would prevent a mortal hemorrhage, even should the pulmonary respiration not be established immediately.

Treatment.—Where there is reason to believe that the child is very small, as it would be in a case of premature labour, or that the pelvis has such large dimensions that the inferior part of the uterus is found strongly pressed downward towards the floor of the basin, or even through the vulvar orifice, and has to be carefully sustained until the cervix is sufficiently dilated to permit the head's free passage, we might, like M. Nægèle, apply a large T bandage in front of the vulva, extending up over the prominent part of the womb, and having an opening at its centre corresponding to the orifice of the vagina; and if the patient had been delivered too rapidly in her previous pregnancies, the opiates might be administered, either by the mouth, or by injection, for the purpose of calming the excessive irritability of the uterus. Wigand has recommended venesection, which, perhaps, might be employed with advantage in strong and plethoric women, but experience has not yet determined the efficacy of the measure as a general remedy. In all cases, the woman ought to lie down in bed on the occurrence of the very first pain, and she should avoid bearing down or contracting the muscles subjected to the influence of her will, as much as possible, during the pain; and the same object would be materially aided by applying a moderately drawn bandage around the abdomen (Rigby). Finally, every precaution is to be taken to retard the rupture of the membranes as long as possible.

BOOK II.

OF LABOURS RENDERED DIFFICULT, IMPOSSIBLE, OR DANGEROUS BY OBSTACLES THAT OPPOSE THE READY EXPULSION OF THE FœTUS.

THE material obstacles which too often render the spontaneous labour difficult or impossible, are exceedingly numerous, and depend both on the mother and child. The diseases and vices of conformation, or of direction, in the canal which the fœtus has to traverse, are naturally included among the first; and to the second we must refer the maladies and vicious conformations of the infant itself, as also the unfavorable positions in which it may present at the superior opening of the pelvis. We shall commence our description with the obstacles appertaining to the mother's organs, and will first treat of the vices of conformation in the basin.

CHAPTER I.

OF THE VICES OF CONFORMATION OF THE PELVIS.

WHENEVER the basin departs from the dimensions heretofore described as the normal ones, there is said to be a vice or malformation of it; which, as the reader will readily understand, may either be an enlargement or a diminution of the average size; and this explains the division admitted by accoucheurs, into pelvis deformed by excess of amplitude, and those deformed by excess of retraction. I say by *excess* of amplitude or of retraction, for it must not be supposed that a pelvis is reputed to be malformed, whenever it does not exactly present the dimensions before given as the ordinary standard; because, in its development, this is subjected to the influence of the same laws that regulate the whole organism, and we all know what great varieties those laws exhibit in their accomplishment. Therefore, as a few lines, more or less, do not constitute a vice of conformation, we shall only include under the title of malformed pelvises those which, from their excessive size or narrowness, are capable of producing notable difficulties in the exercise of the puerperal functions.

§ 1. OF THE PELVIS, DEFORMED BY EXCESS OF AMPLITUDE.

A large basin is not always a favorable circumstance, as might at first sight be supposed; because, if the amplitude is too great, it exposes the woman to serious accidents, both in the non-gravid, the pregnant, and the parturient state. Thus, in the unimpregnated condition, the uterus, not deriving an adequate support from the walls of the excavation, and being free and movable in an over-spacious cavity, is much more liable to the various displacements known as the descent, the anteversion, and the retroversion of the womb; which accidents are then the more unfortunate, as they are the more difficult to remedy.

During gestation, the womb, finding more space in the pelvic cavity, remains there until a much more advanced period of pregnancy, when the volume of the organ, by compressing the rectum and the bladder, often occasions an excessive tenesmus in these parts, which proves very distressing to the patient; sometimes, even the course of the urine and fecal matters is impeded, besides which, varices, hemorrhoidal tumors, or a considerable infiltration of the lower parts are found to be developed, in consequence of the mechanical obstacle to the circulation in the inferior extremities. Again, when this excess of amplitude is restricted to the excavation, while the straits vary but little, if any, from their normal dimen-

sions, the fundus of the womb is often turned back into the hollow of the sacrum ; and, somewhat later, when its volume is too great to permit a longer sojourn in the lesser pelvis, it meets with difficulties at the superior strait which it cannot surmount ; and the impediment then offered, in either case, to the ulterior development of the organ, frequently brings on an abortion. At the end of gestation, the head engaging early at the superior strait, gets low down into the excavation, and presses on the neighboring parts ; whence all the unpleasant symptoms that had accompanied the first onset of this state are found to be renewed in its latter months.

Pending the travail, the excess of amplitude of the pelvis exposes the woman to all the dangers that may result from a too rapid delivery ; for, if she brings into play the voluntary muscles, long before the proper dilatation of the os uteri, or bears down too strongly during the pain, the organ, being imperfectly sustained by the osseous walls of the canal, may be forced down as far as the vulva ; and, indeed, be driven completely beyond the parts of generation ; or, possibly, the circumference of the cervix uteri may yield, and thus give rise to a laceration. Or, supposing the dilatation is already perfected, then the infant, being urged along by the energetic and repeated contractions of the womb, and not encountering a due degree of resistance on the part of the straits, speedily reaches the perineum, and tears its way through, because the latter has not yet had time to become distended ; and a rapid expulsion of the foetus may thus take place at a moment when the patient and her attendants believed it still distant ; and hence, the absence of the ordinary precautions, and the erect position in which she may happen to be, will expose the child to a fall on the floor, or produce a premature separation of the placenta, a rupture of the umbilical cord, or an inversion of the womb ; and, last of all, the matrix, from being suddenly emptied, is sometimes affected with inertia, and becomes the source of a profuse flooding.

After delivery, a very large pelvis permits the uterus, notwithstanding its volume, to sink down into the excavation, and the compression thereby produced on the adjacent organs may become the cause of an inflammation that is always to be dreaded. It is further evident that an excess of amplitude must favor the displacements of the organ ; and it is highly probable that the cases of retroversion reported by Martin, of Lyons, and Vermandois, as having occurred in the first few days immediately following the accouchement, were owing to this circumstance. (*Martin, 158.*)

The indications for treatment, which the vices of conformation in the pelvis, from excess of amplitude present, are exceedingly simple ; for all that we have to do is to keep the patient recumbent throughout the labour, and recommend her not to aid the pains in anywise, and particularly not to bear down until the os uteri is fully dilated ; and, where this process is not yet completed, and the cervix, pressed down by the head, appears at the vulva, we must endeavor to push it back during the interval, and then, by supporting it with the hand,

oppose its escape during the contraction; though, on the contrary, if the neck is sufficiently dilated, the labour is to be terminated by the application of the forceps.

For the indications to be fulfilled during the progress of gestation, we refer to page 224, *et seq.*; as also, for those presented by the displacements of the uterus in the course of the labour itself, to the following chapter.

§ 2. OF THE PELVIS DEFORMED BY EXCESS OF RETRACTION.

Among the various conditions necessary to a spontaneous labour, there is one whose importance cannot be contested, namely: that a just proportion exist between the dimensions of the canal, and those of the body that must traverse it; for, whenever this relation does not appear, whether owing to a retraction of the pelvis, or to the child's abnormal size, the delivery is no longer possible; and whenever this disproportion is carried to an extreme, we have only to choose between two resources that are equally disastrous in their consequences, that is, to diminish the volume of the infant, or to enlarge the way it has to pass through. The retractions of the pelvis, therefore, are the most terrible accidents that can occur in the practice of our art, and their importance, in every point of view, sufficiently warrants the detail into which we are about to enter.

The various degrees of retraction, the differences in their seat, and the varieties of form the pelvis then assumes, are so numerous, that it is indispensably necessary to adopt some general arrangement; to collect them into classes, to form groups, and then to attach these to certain principal types that are easily recognized; the number of which, however (to aid their acquisition by students), must not be too greatly multiplied; and, after having thus classified the different varieties of deformities from retraction, we must study their principal characters, and endeavor to point out their causes, their mode of development, their means of recognition, and, lastly, the indications for treatment, that each of them presents.

ARTICLE I.

PATHOLOGICAL ANATOMY.

As regards their form and external configuration, the retracted pelvis may be divided into two very distinct groups; for either the basin, although greatly retracted in all its dimensions, is properly formed, and presents no irregularity in its exterior aspect, or else the retraction affects only one or more of its diameters (the others maintaining very nearly their normal length), and this partial alteration completely changes its outer form.

§ 1. OF THE SIMPLE RETRACTED PELVIS, WITHOUT CURVATURE OR MALFORMATION OF THE BONES. (Absolute narrowness.—*Velpeau.*)

Before the researches of Professor Nægèle, whose principal work on this subject will soon be disseminated throughout France, thanks to the translation just published by M. Danyau, there was scarcely any mention made of this variety of retraction, in the leading classic works; for most of the French and English authors merely stated that a narrowness is rarely met with in all parts of the basin at one and the same time, and that it is still more rarely carried to a point demanding the intervention of art; and it was reserved for M. Nægèle to point out the importance of this particular variety.

In his collection, he numbers four pelvis that are retracted throughout, and all their diameters are one inch less than the normal dimensions; and these have all required either the Cæsarean operation or the mutilation of the foetus. Three of them were obtained from women of an ordinary stature, the fourth belonged to a dwarf thirty-one years of age, and only forty-six inches in height, though otherwise well formed. As regards the respective lengths of their different diameters, and the form of the pubic arch, each one of these presents the characters of a regularly formed pelvis, whose dimensions may be supposed to have been reduced; and, as to the condition of the bones, that is to say, their color, strength, and texture, there is no departure from the healthy standard. In one of them there is even a tendency to a greater density of the osseous tissue. Further, these basins have nothing in common with those deformed in consequence of rachitis, as the consistence, density, thickness, and size of the bones, and the regular shape of the pubic arch sufficiently prove; besides, the individuals from whom they were procured, presented no traces of that affection during life; and the examination of other parts of the skeleton fully confirmed this distinction, which we hope to prove in a still more decisive manner hereafter, when the causes and particular development of this species of retraction shall be studied.

M. Nægèle admits two distinct varieties in the mal-formed pelvis under consideration: in one of which he says the basin, with respect to its thickness, strength, texture, and indeed all the physical characters of the bones (volume excepted), does not differ from a normal one; and it is met with in persons of either a small, an ordinary, or a high stature, who may be otherwise well-formed and thin, and whose external appearance would not cause the least suspicion of such a formation; whence it can only be recognized by a local exploration. In the other, the pelvis is wholly different; for, as regards their volume, substance, and strength, the bones exhibit the characteristics of childhood; and the same remark is applicable to their mode of union with each other. This variety is only observed in very small individuals, such as dwarfs; and the relations of the diameters with one another, and the form of the pubic arch are such as are found in the girl, when the sexual system has just completed its development. Thus, for example, in the dwarf before cited, whose

height was but forty-six inches, the pelvis had the following dimensions, viz. :—

From the promontory of the sacrum to the point of the coccyx	3½ inches.
The antero-posterior diameter of the superior strait .	3⅓ "
Transverse diameter of " " .	3⅔ "
Antero-posterior diameter of the excavation	3⅓ "
Transverse diameter " "	3⅓ "
Transverse diameter of the inferior strait	3⅓ "
Depth of the symphysis pubis	nearly 1 inch.

§ 2. OF THE PELVIS RETRACTED BY THE CURVATURE, AND MAL-FORMATION OF THE BONES. (Relative narrowness.—*Velpeau*.)

In those cases where the basin is diminished in its extent by the curvature and malformation of its constituent bones, the deformity may be referred to one of the three principal types described by M. Dubois; that is, either to a flattening from before backwards, to a compression on the sides, or to the depression of the anterior and lateral parts; the first variety, or flattening, shortens the antero-posterior diameters, the lateral compression diminishes the transverse ones, and the depression of the antero-lateral walls contracts the oblique diameters. Again, each of these varieties may affect either the superior strait, the inferior strait, or the excavation, though most usually the two straits are retracted at the same time.

A. The flattening from before backwards, or shortening of the antero-posterior diameter, results from a more or less marked approximation of the anterior and posterior pelvic walls; and this species of malformation exhibits several varieties, as regards the extent of retraction, both in height and width. For instance, the superior strait alone may be diminished, while the excavation retains its normal capacity; this phenomenon is caused by the unusual curvature of the sacrum, which is sometimes so bent anteriorly as almost to represent an obtuse angle at its middle part, whereby the base of the bone is thrown forward in such a way, as to singularly augment the prominence of the sacro-vertebral angle. But the contrary may also occur, and the sacrum, instead of presenting an anterior concavity, is quite plane, or occasionally is even convex in front; and then the excavation is retracted simultaneously with the superior strait, in its antero-posterior diameter, and it really seems as if this bone, having lost its natural curvature, had been pushed forward in totality.

The shortening of the antero-posterior diameter of the superior strait, sometimes accompanies an enlargement of the corresponding one at the inferior strait. This, indeed, is the most frequent arrangement, and is what generally takes place, when the sacrum, yielding under the weight of the trunk transmitted to it through the spinal column, becomes reversed, that is, the base is projected forward, while its coccygeal extremity is forcibly pushed backward.

Lastly, the coccygeal and the sacro-pubic diameters may be retracted, at the same time, if it should happen that the sacrum,

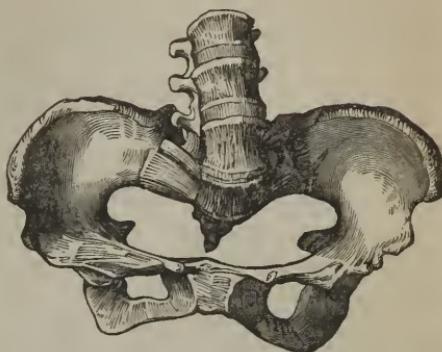
instead of performing the see-saw movement just alluded to, caves in, in such a way that its two extremities are thrown forward; whereby the anterior curvature is greatly augmented, and consequently the corresponding diameter of the excavation enlarged.

In the approximation of the antero-posterior walls, the sacrum is nearly always the misplaced bone; but although much more rare, a flattening of the anterior pubic wall is also met with; and then the symphysis pubis, instead of presenting a convexity in front, is perfectly flat or even (as in one instance represented by Madame Boivin) constitutes a depression, which seems to protrude inwardly towards the prominence of the sacrum; and this double inclination of the pubis and sacrum towards each other, gives to the superior strait the form of a figure of eight; that is, its plane is divided into two rounded portions on the sides, corresponding to the iliac fossæ, and it is separated in the middle by a restricted part, of variable width; and hence, however inconsiderable the depression may be, the antero-posterior diameters of the two straits, and of the excavation, must evidently be affected by it.

But there is yet another way in which the symphysis pubis may contribute to the narrowness of the pelvis; for instance, its vertical extent is sometimes much greater than usual, whereby the antero-posterior diameter of the inferior strait may be considerably diminished; and this extraordinary length gives rise to what is termed the *bar pelvis*; or the same effect may be produced by an excessive inclination backwards at its lower end.

Again, the coccy-pupal diameter may be shortened, it is said, by an elongation, or rather a horizontal direction of the coccyx, and more particularly by an immobility of the sacro-coccygeal articulation; which latter circumstance has been invoked in explanation of the slowness and difficulty of first labours, in middle-aged women; but, as M. A. Dubois has remarked, the delay of the head's delivery in such persons does not usually depend on an immobility of

Fig. 68.



A pelvis in which the contraction of the sacro-pubic diameter is produced by the unusual prominence of the sacro-vertebral angle.

Fig. 69.



The shape of the superior strait in the figure-of-eight pelvis.

the coccyx, but is more probably owing to the rigidity in the soft parts, which then offer a considerable resistance.

b. The *compression of the lateral walls* by which the transverse diameter is shortened, is the most rare of all the varieties of conformation, at least so far as concerns the superior strait and upper part of the excavation; but for the inferior strait, on the contrary, the approximation of the two ischial tuberosities (which there constitutes this species of deformity) is quite as frequent as the shortening of the coccyx-pubic diameter, the malformation resulting from the approach of those tuberosities, as well as that of the branches of the pubic arch; and this latter then assumes the triangular form peculiar to the male sex. Besides which, the lower part of the excavation may be notably diminished in the transverse direction, by the inward projection of the spines of the ischia.

The transverse retraction is seldom as well marked as the flattening from before backwards, especially at the superior strait, where it is, in general, limited to diminishing the bis-iliae diameter from a few lines to an inch in its length, by elongating the antero-posterior one to the same extent; for the coxal bones are then less curved, and the sacrum is thrust backwards, while the pubes are more prolonged in front. Of course, the upper strait will be more or less altered in its form according to the degree of compression, for where this is inconsiderable, its periphery is nearly circular; but, on the contrary, when more marked, it represents an ovoid, the larger extremity of which is posteriorly.

Another variety of transverse retraction is owing to the fact of the basin being less developed in one of its halves than in the other, and consequently to its exhibiting a less degree of curvature in that part, than upon the opposite side; in which case, the articulation of the spine with the sacrum no longer corresponds to the median line, and the vertebral column is found nearer to the hip of the retracted side; the transverse diameter is likewise diminished at the inferior strait by reason of the obliquity in the entering part of the coxal bone, for the antagonism before alluded to, as existing between the antero-posterior diameters of the superior and the inferior straits, whereby the elongation of one most frequently coincides with a shortening of the other, rarely exists in the transverse direction; since the deformity produced by a congenital displacement of the femurs is probably the only condition in which the transverse diameter of the inferior strait augments at the same time that the bis-iliac one diminishes; the enlargement in the lower part of the pelvis, in this instance, being marked by an unusual width in the pubic arch, a great obliquity of the ischio-pubic rami, a separation of the ischial tuberosities, &c. (*Vide art. Causes.*)

c. The *depression of the antero-lateral walls*, which diminishes the oblique diameters, is much more frequent than the preceding variety, though it is more rare than the flattening from before backwards, and it may exist on one, or both sides at the same time. This deformity consists, essentially, in the flattening, or inward projection of the coxal bone, at the part corresponding to the obtuse

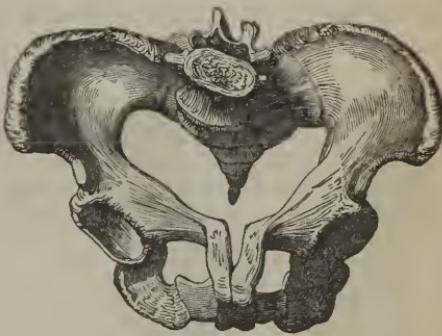
cavity, and to the junction of its three constituent pieces; whence there results at this point a greater or less diminution of the curve which the pelvic circumference usually describes; and when existing in a high degree, the curvature is even reversed, its convexity being turned towards the sacrum, while, at the same time, the pubis departs from its normal transverse direction, and runs almost directly forwards; so that the deformity is produced by the coxal bones having then assumed the form of an old italic *S*, instead of presenting a regular arch.

Where this takes place to the same extent on both sides, the pelvis maintains a degree of symmetry, and the superior strait is shaped like the trefoil leaf; that is, it presents three lobes, one anteriorly, which corresponds to the more acute angle of the pubis, and two posteriorly and laterally, formed by the union of the iliac bones with the sacrum. But, it far oftener happens that the deformity is more marked in the coxal bone of one side, than upon the other, and then the shape of the pelvis is so much the more irregular as the deformity in the *os innominatum* is the better marked.

Where this double disfiguration of the hip bones exists in a high degree, more especially when it is located on the anterior pelvic wall, it affects both the oblique and antero-posterior diameters at the same time. In fact, these bones are then approximated in a parallel manner, being only separated from each other by a slight distance, for the extent of an inch or two, while the rest of the pelvis is comparatively regular; and hence, although the symphysis pubis may be within the normal distance from the sacro-vertebral angle, yet it is not the less true, that the antero-posterior diameter of the superior strait will be virtually shortened in all its forward part, that comprised in the fissure left between the two deformed antero-lateral walls, because this contracted portion cannot contribute in anywise to the passage of the foetal head.

Again, we may remark, with M. P. Dubois, that as the anterior arch of the pelvis has but very little depth at the point corresponding to the depression of its lateral walls, and as the surface compressed by the head of the femur occupies the largest portion of it, the whole of that region must almost necessarily be pressed in; and, consequently, that the shortening must affect all the diameters at once, those of the excavation and of the abdominal and perineal straits; though the retraction is in general less marked at the infe-

Fig. 70.



A pelvis in which the sinking-in of the antero-lateral walls exists on both sides.

rior strait than elsewhere, because the lower part of the ischium is not carried so far inwards and backwards as the cotyloid region.

As to the variety of deformity recently described by M. Nægèle, the celebrated professor of Heidelberg, under the title of *oblique retraction*, we may evidently refer it also to a shortening of one of the oblique diameters. His book on the subject has recently been translated with the greatest care by M. Danyau, who has enhanced the value of this admirable work by the addition of learned notes; but, as we had induced Dr. Steege, before the publication of Danyau's translation, to prepare for us a chapter in which M. Nægèle describes the principal characters of his oblique pelvis, we submit the following account of it, which we owe to the courtesy of our "Confrere."

The particular conformation of a new variety of deformed pelvis (forming the subject of Nægèle's monograph).

"The principal characteristics of these deformed basins are the following, namely:—

"1. A complete ankylosis of one of the sacro-iliac articulations, or a perfect fusion of the sacrum and one of the iliac bones together.*

"2. An arrest of development, or an imperfect development of the lateral moiety of the sacrum, and a defect of amplitude, or a retracted opening in the anterior sacral foramina on the ankylosed side.

"3. On the same side, a reduced size of the os ilium, and, consequently, a diminished extent of the ischiatic notches of this latter; that is to say, the distance between its anterior-superior and its posterior-superior spinous processes, as well as an imaginary line, drawn at the entrance of the basin, commencing at the spot where the sacro-iliac symphysis would be (if it existed), and running along the linea innominata and the linea ileo-pectinea as far as the pubic symphysis, is shorter here than on the opposite side. Further, the part cor-

Fig. 71.



A figure taken from M. Nægèle's work, which exhibits the characters of the oblique-oval pelvis in a high degree.

responding to the articular surface, on the ankylosed bone (which is here continued into the acrum without any transition), neither extends so high up, nor descends so low, as upon the opposite side,

* We retain the expression *ankylosis* on account of brevity, and because it is the one generally used to designate the condition under consideration; but we formally protest against the imputation of having admitted that these bones had originally been well formed, and had only contracted this continuity of structure in consequence of some disease. Perhaps the term *synostosis* or *synezisis* would better designate the perfect fusion here alluded to.

or as it would in a well-formed ilium; or, to explain myself more clearly, if we suppose the ilium and sacrum of the ankylosed side to be temporarily separated, and then reunited through the intervention of a fibro-cartilaginous disc, as occurs in the natural state, the articular surface or the junction of these two bones would be found much shorter, and, of course, would not descend so low as on the opposite side, which is exempt from fusion, or as it does in a well-formed pelvis.

"4. The sacrum seems to be distorted on the fused side, and it also has its anterior surface turned more or less towards this side, whilst the symphysis pubis is pressed over to the opposite one; an arrangement whereby the symphysis is no longer found directly in front of the promontory, as it ought to be, but is caused to assume an oblique position.

"5. The internal surface of the ilium, on the ankylosed moiety, is more flattened in that part which contributes to the formation of the pelvic cavity, and sometimes even (in cases of great deformity) is almost entirely plane; in such a way, for example, that a line drawn from the middle, or even the posterior extremity of the linea innominata, and running along the body and horizontal branch of the pubis as far as the symphysis, will be nearly a straight line; but we have never seen an inclination inwards at this part, nor have we particularly observed that inward projection of the horizontal branch of the pubis that is found in pelvis deformed in consequence of malacosteon in the adult.

"6. The other lateral moiety of the pelvis, or the one where the sacro-iliac articulation still exists, likewise departs from the normal condition; although, where the obliquity is inconsiderable, we may easily deceive ourselves at first sight, and be induced to suppose that there is a natural conformation of the non-ankylosed half; but this is not the fact, as can be proved by supposing two pelvis to be similarly deformed, with this difference only, that in one the fusion of the sacro-iliac articulation takes place on the left side, while in the other it is on the right; and then making a section of each through the symphysis pubis and the middle line of the sacrum; when, by attempting to fit the right moiety of the first of these pelvis to the left half of the second, by bringing the cut surfaces of the two sacra against each other, we shall find that the pubic bones are separated by an interval of three to four inches.

Consequently, the lateral moiety of the basin exempt from fusion, not only participates in the abnormal situation and direction of the bones, but also in their irregular form; and this to such an extent that, if a line should be drawn on the non-fused side from the middle of the promontory, along the linea innominata and linea ileo-pectinea as far as the symphysis pubis, it would be more curved in its posterior, and less so in its anterior half, than in a normal pelvis."

Whence it follows:—

"7. A. That the basin is retracted obliquely, that is to say, in the direction of one of the ordinary oblique diameters, while in the other (which runs from the point of ankylosis to the opposite cotyloid

cavity) it is not at all diminished, but may even be larger than usual, when the obliquity of the pelvis is well marked.

"Wherefore, the superior strait, or, in other words, the surface limited by a line traced along the spines of the two pubes, and thence along the lineaæ innominatae and prolonged on the sacrum, as well as the imaginary plane at the centre of the pelvic excavation (in the place where we usually admit the middle opening of the pelvis, *apertura pelvis media*), will resemble, strictly speaking, an oblique oval when viewed in front; the transverse or small diameter of which will be represented by the retracted oblique diameter, and its great, or longitudinal one, by the opposite oblique diameter; and therefore, as regards their form, the basins in question might very properly be designated by the title of the *oblique-oval pelvis (pelvis oblique-ovata)*.

"B. That the distance from the promontory of the sacrum to the point corresponding to either cotyloid cavity (the sacro-cotyloid interval), as well as that from the apex of this bone to the spines of the ischia, would be less on the side where the ankylosis exists.

"c. That the distance from the tuber ischii on the ankylosed moiety to the posterior-superior spinous process of the opposite ilium, as also that between the spinous process of the last lumbar vertebra and the anterior-superior spine of the ilium on the ankylosed portion, are smaller than the corresponding dimensions of the opposite side.

"D. That the distance from the inferior border of the symphysis pubis to the posterior-superior spinous process of the ilium is greater on the ankylosed bone than on the opposite side.

"E. That the walls of the pelvic excavation converge somewhat obliquely from above downwards, whereby the pubic arch is more or less narrowed, and therefore made to approach in a measure to the form of the male pelvis, as a natural consequence of the improper direction of its ramus which is turned towards the flattened pelvic wall. Of course, these two dispositions, as also the narrowing of the ischiatic notch, the diminution of the distance between the two ischiatic spines and the one-sided and defective development of the sacrum, will be in direct relation with the degree of obliquity.

"F. And finally, that on the flattened side the acetabulum is inclined much more anteriorly than in the normal state, whilst on the opposite side it is turned almost directly outwards; and hence, when examining the pelvis from in front, we can look directly into the first cotyloid cavity, but the view will only graze the second, or possibly may embrace a small part of its excavation. Further, to give as clear an idea of the deformity as possible to those who have never seen a pelvis of the kind, we will observe that at first sight the basin looks as if it had been pressed in by some external force acting in an oblique direction from below upwards and from without inwards, and making its influence felt on the anterior pelvic wall at the cotyloid region, whilst the other moiety of the lateral wall has been simultaneously pressed from without inwards, at its posterior part.

"Another peculiarity of these pelvis is, that they only differ from

each other by the degree of obliquity and in the side where the ankylosis takes place; whereas, in all other points, that is, in the principal characteristics of their malformation, they are as similar as two eggs; and this remark is so true, that an experienced person (who was unaware of the circumstance) would be disposed to take two different specimens, if presented to him separately, for one and the same, and it would even be difficult to persuade him of his error; an instance of which we shall presently give.

"As to the other conditions of the bones in the oblique-oval pelvis (laying aside the deviations just enumerated), that is, as regards their strength, size, texture, color, etc., they do not differ in any-wise from healthy bones, such as those met with in young persons exempt from all deformity; thus, for example, none of those signs are observed in them, neither as to their form nor in other respects, which are so often found after rachitis or malacosteon; for if the existing deformities were supposed to disappear, all the pelves we have yet had an opportunity of examining would bear a general resemblance to well-formed ones; most of them were of the medium size, and the others were either above or below it, but in no one of the cases that we have particularly traced out has there been a rachitic diathesis, and in no one did the phenomena, symptoms, or morbid modifications exist, which would have either preceded or followed the English malady, or mollities ossium, after puberty; and further, in no instance could the action of external prejudicial influences, such as falls or blows, etc., be detected, and there were never any antecedent pains or lameness; although, in one instance, we suspected a slight limping, from seeing the patient walk, but other skillful persons, who were present at the examination, did not detect it, and the relatives and all the family of the woman in question positively declared they had never remarked anything of the kind.

"In two of the specimens of this variety in our collection which have the lower vertebræ attached, the spinal column is straight in the lumbar region; but in the others it is inclined on the side, exempt from ankylosis; though, in all that are provided with the lumbar vertebræ, the anterior face of the bodies of these bones is more or less directed towards the ankylosed side."

The reader will see, by the translation just given, that M. Nægèle attaches a very great degree of importance to the ankylosis of the sacro-iliac articulation, which he makes a pathognomonic character of the deformed pelvis, described by him under the name of the *oblique-oval*; but, if I might hazard an opinion after such high authority, I should unhesitatingly reject this proposition, because there are numerous pelves which present all the characters of those oblique ones, described in the monograph of the Heidelberg professor, and yet in which there is no fusion of either sacro-iliac articulation to be found. M. Nægèle himself, with that candor characteristic of the truly great, speaks in his admirable work of basins that were similar to those previously published by him, and which only differed from them by the absence of ankylosis. He alludes to several others, and states that he knows of the existence of many

more, the exact description of which has been promised him. I shall have occasion hereafter to revert to this subject, but I cannot refrain from saying now, that if the ankylosis is no longer to be considered as a constant phenomenon, as a pathognomonic character of the pelvis in question, if it is nothing more than a pathological coincidence, happening in most cases, then I can only see in the oblique-oval pelvis the association of two of the three types, to which we have referred all the varieties of pelvic malformation ; for, in considering it in a practical point of view, and laying aside its extraordinary anatomical peculiarities, it will exhibit, simultaneously, the compression of one of the antero-lateral walls, and the oblique prominence of the sacro-vertebral angle.

This remark naturally leads us to the important observation that, hitherto we have considered each of the species of deformity that may alter the various pelvic diameters, as being separate and distinct, since there are some which may exist alone, and only change the corresponding diameters; but, besides the fact that different points of the pelvic circle may be simultaneously deformed, and thus contract the basin in several directions at once ; the form and extent of the pelvis are such that it is difficult for a flattening, a lateral compression, or a depression of the antero-lateral parts to take place, even separately, without its being thereby contracted in several of its diameters. Let us suppose, for instance, that one of the oblique diameters has been diminished by the depression of the bottom of the acetabulum ; and it must be evident that, however inconsiderable this depression may be, the body of the ischium cannot be thus thrust inwards and backwards, without drawing along with it at the same time, some considerable portion of the anterior part of the basin, and of the arch formed by its lateral moiety, and consequently, without retracting more or less, certain of the antero-posterior and transverse diameters. Again, where the sacro-vertebral angle, from being projected forward, diminishes the length of the antero-posterior diameter of the superior strait, we have supposed that it followed the sacro-pubic line, in its movement of progression ; but, as readily foreseen, it would most often prove otherwise, for the very frequent obliquity in the direction of the forces transmitted through the vertebral column, must compel it to lean towards the right or the left, as well as to the front ; whence, the retraction of the antero-posterior diameter necessarily entails that of the sacro-cotyloid interval, and, as a consequence, diminishing the whole corresponding moiety of the pelvis. Now, should the depression of the antero-lateral wall on the same side be joined to this, as just supposed, we should have the oblique-oval pelvis of M. Nægèle, excepting the ankylosis of the sacro-iliac articulation.*

Again, the three principal types may be found united in the same

* This ankylosis is nothing more than a curious pathological fact, one in reality having no practical value, and therefore not worthy of the importance accorded to it by M. Nægèle ; on which account we have determined not to make a particular variety of the oblique-oval pelvis, but have concluded to refer it to the compression of the antero-lateral walls.

basin, whereby the latter is very irregularly deformed in all its diameters. This occurs more particularly in the vices of conformation produced by malacosteon, but it is also sometimes met with, even in a high degree, in cases dependent on rachitis, as fully proved by the facts observed by M. Nægèle.

From all which, we learn what great diversities of shape may be presented in practice by deformed pelves. And Madame Lachapelle has gone so far as to designate these varieties by the titles of the *reniform*, the *triangular*, the *bi-lobed*, the *rounded*, the *oval*, the *cordiform*, the *trapezoid*, the *pyramidal*, and the *three-lobed straits*; but she has greatly multiplied the species without any practical utility, and she further admits that there are numerous undescribed varieties for each of these orders.

The Degree of Retraction.—The two extremes of retraction in the straits are from three and three-quarters to four inches for the highest, and from two to three lines for the least, and between these two the pelvis may exhibit all the intermediate degrees of narrowness. The causes which produced the deformity greatly influence the degree of retraction, and in this point of view they may be arranged in the following order, viz.: malacosteon, rickets, congenital luxations of the femur, deformities of the spinal column, etc.; and we shall again take occasion hereafter to revert to the mode in which each of these act.

Of the Variations in the Depth of the Pelvis.—The vices of conformation, just spoken of, rarely exist without modifying the depth of the pelvis, in a greater or less degree; which circumstance has been particularly dwelt upon by M. Bouvier, in the able work presented by him to the Institute. For instance, the depth may be either augmented or diminished by the variable inclination in the expanded portion of the iliac bones, or in the branches of the pubic arch, as also by the diversities in the length of the sacrum.

Sometimes this latter bone is very short, its contraction being produced either by an excess of the anterior curvature, which brings the two extremities nearer to each other, or by an arrest of development.

Occasionally, the iliac fossæ are flattened out, as if they had been forcibly pressed from without inwards, thus giving it the appearance of a male pelvis; and this phenomenon may be further augmented by exterior and lateral pressure, whereby the bones are rendered quite vertical, and the normal depth of the basin is greatly increased; or the contrary may occur where the iliac crests, from being strongly depressed and thrust outwards, enlarge the margin of the pelvis, but evidently diminish its height; and it would be difficult to misinterpret the influence the weight of the viscera would have in such a case when there is no congenital deformity in question. (Bouvier, *op. citato.*)

In conclusion, a widening of the pubic arch must clearly diminish its height to a corresponding extent; while the latter, as well as the whole depth of the pelvis, must be increased, where the ischio-pubic rami are very close together.

ARTICLE II.

OF THE CAUSES AND MODE OF PRODUCTION OF THE PELVIC DEFORMITIES.

For a long time the vices of conformation in the pelvis, as also most of the deformities occurring in the skeleton at large, had been uniformly attributed to the operation of a single cause, rachitis; but, owing to the more careful researches of modern surgeons, it is possible, at the present day, to ascertain more precisely the effects of rickets on the osseous system, and to appreciate the influence that other general or local diseases may have over the perfect or the defective conformation of the basin. And here I must again extract largely from the valuable works of Nægèle, Bouvier, Sedillot, and others.

An examination of the recorded cases clearly proves that the pelvis may be deformed under circumstances where there has been no rachitis properly so called; and where causes that are purely mechanical in their operation have altered the configuration of its constituent parts at a period when their force of resistance was inconsiderable, not in consequence of any pathological softening in their structure, but solely from the tender age of the patient, or the feebleness of its constitution. And hence, as regards the causes that produce the changes in their form, we might classify all the irregular pelvises under three principal types, namely: a. Vices of conformation, dependent on a softening of the bones, whether from rachitis or from mollities ossium; b. Those consecutive to, and dependent upon, a previous deformity of another part of the skeleton; and c. Vices of conformation by absolute narrowness.

§ 1. OF THE PELVIS DEFORMED BY RACHITIS OR MALACOSTEON.

We are not about to enter here into a detailed consideration of the causes that preside over the development of the disorders known as rachitis and mollities ossium; for the general phenomena produced by them, and, more especially, the greater softening, fragility, and flexibility in the osseous tissue, are so well known to pathologists that we need only mention them; but our present duty is to study their influence over the production of the numerous vices of conformation summed up in the preceding article. For an indication of the characters that distinguish a pelvis deformed by rachitis from one distorted in consequence of a softening of the bones, we refer the reader to the article on *Diagnosis*; nevertheless, we may observe here that, although these two diseases differ from each other in numerous anatomical characteristics, yet they produce the same result; for, by softening the osseous tissue, they diminish its resistance.

But this ramollissement, or want of resistance on the part of the bones, is not of itself sufficient to explain the various deformities exhibited by the pelvis; because, excepting in certain very rare

cases, where the osseous tissue is almost gelatinous in its consistence, it must be evident that the bones can only sink in and become distorted by the action of an exterior force, without which, their conformation would remain intact. For where rachitis affects them, it has no other immediate consequence than to diminish their solidity, and of itself contributes in nowise to the alteration of their shape; though it is true that the softening manifested in the adult by malacosteon may be so great, that the weight of the superior parts of the body alone might produce a crushing-in of the bones; but, laying aside these unusual instances, we must seek in the influence of some external force, which is wholly independent of the principal disease, for the cause of the malformation. Now this exterior force sometimes resides in the muscular action, though still more frequently (so far as regards the pelvis) in the weight of the parts it has to support; for, being placed, as we have elsewhere described, below the trunk and directly upon the lower extremities to which, in the erect position, it transmits the whole weight of the superior parts of the body, the pelvis is found in the most favorable conditions for the production of deformity; because the weight of the trunk, when erect, which is transmitted from the lumbar vertebrae to the heads of the femurs in the direction of two oblique lines that intersect the sides of the superior strait, manifestly tends to augment the curvature at the posterior part of the ilium, and to depress the osseous circle which the pelvic cavity represents; and this weight, acting at first in a more special manner on the base of the sacrum, has a tendency to push the latter insensibly forwards. The ossa pubes would be equally pressed towards the sacrum, though in such a manner that their posterior extremity (the one nearest to the acetabulum, which supports the weight) gets somewhat nearer to the sacro-vertebral angle than does their anterior or symphyseal extremity; whence we may learn why the retractions of the pelvis more often affect the superior strait than other parts; and why, at this strait, the antero-posterior and oblique diameters and the sacro-cotyloid interval, are far more frequently contracted than the transverse ones.

And it will be equally evident that, when the weight acts more particularly on one side of the basin, the sinking-in is more marked in that direction, if we bear in mind the change that then takes place in the centre of gravity from the inclination of the spine, the curvature of which so often precedes a deformity in the basin; as also the very unequal pressure from the weight of the body on the two sides of this cavity, where a difference of length in the lower extremities depresses one of the coxal bones more than the other; whereby the acetabulum of one side is thrown almost directly under the sacrum, whilst, on the other, the cotyloid cavity receives its weight very obliquely. (Bouvier.) It is further evident that the individual's customary attitude, and the nature of her exercises, must likewise add to the irregularity in the figure of this part.

After having studied the causes that determine the oblique projection of the sacro-vertebral angle, and the flattening of one of the

pelvis's antero-lateral walls, we explained the production of the vice of conformation described by M. Nægèle, which, as already stated, appeared to us to result simply from a conjunction of these two varieties in the same person; but there is one circumstance yet remaining to be explained, that is, the complete fusion of the sacrum and ilium together, and the consequent disappearance of the sacroiliac articulation on the retracted side. Now is this ankylosis congenital? Is it the result of some inflammation occurring after infancy? or is it to be attributed to the curvature of the vertebral column? We confess that a sufficient mass of materials are still wanting to decide the question; although M. Nægèle seems to think that this fusion, as well as the deformity of which, in his estimation, it is the essential character, results from an anomaly of original development; "but," he adds, in conclusion, "I am not prepared to decide positively." (For further details, see M. Danyau's translation.)

If the child is in the habit of sitting much, the weight transmitted by the lumbar vertebrae may likewise press the sacro-vertebral angle forward; but the sacrum also often sinks in, and its base is carried forward simultaneously with the point of the coccyx, whereby its anterior concavity is augmented, and the antero-posterior diameters of both the superior and the inferior straits are equally affected.

The lateral compression, operating from one side to the other, or the retraction of one or more of the transverse diameters, supposes an action diametrically opposite to the preceding, and it generally results from a lateral force acting from without inwards; which force may be referred either to the weight of the body, where the child uniformly reposes on its side, or to the unequal pressure of some improperly adjusted bandage, or the arms of an awkward nurse. But if, on the contrary, the infant habitually leans more towards one side than the other when seated, one of the ischial tuberosities having to support a more considerable weight than its fellow may be distorted inwardly; sometimes even the pressure will be successively felt on each, and they are then approximated nearer to one another.

Having now studied the softening of the bones as an immediate source of the deformity, a few observations are yet to be made concerning the causes that produce this ramollissement; for it must not be supposed that mollities ossium and rachitis exercise the same influence over the osseous tissue. Indeed, as a general rule, the softening determined by the former is much more marked than the default of resistance occasioned by the latter; whence it follows that, with the exception of certain rare cases, such as the one cited by M. Nægèle, the more considerable retractions may be referred to malacosteon.

Rachitis is a disease peculiar to infancy, while mollities ossium only occurs in the adult; and this peculiarity appertaining to the former, of only exerting its action during the early years of life, satisfactorily explains how this affection may have two different modes of acting on the pelvis; one of which consists of a softening of the bones, and their consequent sinking in; and the other of a

sort of arrest in their development. "Thus," M. Guerin says, "it would appear from my researches that most of the bones of a rachitic skeleton, when compared with those of a normal one, exhibit an arrested development as regards their different dimensions; which reduction, *independently of what results from the deformity of the bones*, may amount to one-half of their ordinary size; and further, that this reduction is generally greater in the lower parts of the skeleton, and it gradually diminishes from below upwards, from the bones of the legs to the femurs, from these latter to the pelvis, and from the pelvis to the upper extremities and spine, etc." It is, therefore, on the lower extremities particularly, and on the coxal bones, which are appendages of them, that this arrested development exerts its action. "Whence," says M. Dubois, "it necessarily results that the ossa innominata are generally much less developed in rachitic pelvis than in others; and this disposition must powerfully contribute, together with the deformity that usually accompanies it, to contract the limits of the cavity, which these bones, in a great measure, circumscribe; and I am the more convinced of the importance of this fact since, in several instances of deformity occurring in individuals known to be rachitic during infancy, it has appeared to me that the depression of the bones in the degree in which it existed, would have been wholly insufficient to create such insurmountable difficulties, if the depressed bones themselves had been as fully developed as they ought to have been." (*Thése de Concours.*) And we may mention, as another fact bearing on the same point, that the pelvis of the patient on whom M. Moreau performed the Cæsarean operation, had experienced the double influence of rachitis just mentioned; for, though but little deformed, its antero-posterior diameter was only two and three-eighths of an inch in length.

This influence over the development of the pelvic bones, is dependent solely on the tender age at which the affection appears, since it occurs in infancy as stated, that is, at a period when the basin is far from having acquired its perfect organization; whereas malacosteon, on the contrary, does not appear until after puberty, in other words, at an age when the ossa innominata have reached their normal development; and, therefore, although it may soften the bones, it cannot oppose their growth.

Lastly, this action is not set aside by the cure of the disease, but it continues to be felt during the whole period of development, so that, says M. Guerin, the sum of reduction exhibited by the bones of rickety adults, is made up of two successive results; namely, of the reduction dependent on an absolute arrest, or a mere diminution of growth during the disease, and of that caused by a retarded growth subsequent to the malady. This is an important practical remark, showing how far the influence of rachitis over the osseous system may extend.

§ 2. VICES OF CONFORMATION DEPENDENT UPON A PREVIOUS DEFORMITY IN ANOTHER PART OF THE SKELETON.

We have already alluded, in advance, to the influence that a mal-

formation in the spinal column or in the lower extremities, might have over the disposition of the pelvis, and we now proceed to illustrate the mode of action in both cases.

A. *Deviation of the Vertebral Column.*—For a very long period all the deviations of the spinal column were attributed to the baneful influences of rachitis; but owing to the able researches of Bouvier, of Guerin, and many others, this opinion is no longer tenable, since it is now well ascertained that several other diseases may produce abnormal curvatures in this column; and this distinction is even more important to the accoucheur than it is to the orthopedists, for it establishes at once a line of division between those deviations which nearly always coincide with an imperfect conformation of the pelvis, and those which often exist, even where the latter is well formed. The former are of a rachitic nature; but the second are developed under the influence of some other affection. For instance, in sixty-nine cases of deformity in the vertebral column, described by M. Bouvier, the basin exhibited a normal condition, and the extremities were nearly all exempt from alteration in fifty-seven, and but twelve were accompanied by a malformation of this cavity, and by an incurvation of the limbs.

It must not be supposed, however, that the deviations of the spine which are not dependent on rickets, have no influence whatever over the direction and structure of the pelvis. Although it is only in subjects of advanced age, as a general rule, that curvatures of this column, happening after infancy, will ultimately determine changes in the form and direction of the basin; and, therefore, they have but little interest for the accoucheur.

As regards the curvatures that are produced by rickets, though they be not the essential cause of pelvic deformities, yet they do not the less exercise an unfavorable influence over the degree of retraction, and the irregularity in the basin's form; for the same action which gives rise to such sad consequences in old persons, also produces them, in a great measure, in rickety children. In either case, the pelvis yields under the influence of the spinal deviation; with this difference only, that what takes place slowly in the aged, is rapidly effected in the child, because, in the latter, the softening of the bones favors the action of the cause.

The principal alteration consists of a greater inversion of the angle formed by the junction of the lumbar column with the base of the sacrum; and consequently it gives the pelvis a figure more or less similar to that described by Professor Nægèle, under the title of the *oblique-oval*.

B. *Congenital Luxations of the Femur.*—M. Sedillot, in a very interesting memoir on the congenital luxations of the femur, first called attention to the influence which these displacements might exercise on the conformation of the pelvis. The effects of this accident are manifested both in the greater and lesser basin; as may be seen from the following distances which he obtained in a case of double dislocation upwards and outwards, into the external iliac fossæ, by measuring the principal dimensions of the pelvis:—

1. From one anterior-superior spinous process to the other	8 inches.
2. From the middle of one iliac crest to the same point on the opposite side	8½ " "
3. From the middle of the iliac crest to the margin of the abdominal strait	3½ " "
4. From the middle of the iliac crest to the tuber-ischii	6½ " "

Superior or Abdominal Strait.

5. Antero-posterior diameter	4½ " "
6. The same diameter taken from the pubis to the articulation of the first piece of the sacrum with the second*	4½ " "
7. Bis-iliac or transverse diameter	4½ " "
8. Oblique diameter	4½ " "

Perineal Strait.

9. Coccy-pubic diameter	3½ " "
10. Transverse diameter	5½ " "
11. Oblique diameter	4½ " "
12. Summit of the pubic arch	1½ inch.
13. Base of the arch (taken on a level with the inferior border of the oval foramen)	4½ inches.

Pelvic Excavation.

14. Depth of the posterior wall	5 " "
15. Depth of the anterior wall	11½ inch.
16. Thickness of the pubic symphysis	½ " "
17. Depth of the sacral concavity	11½ " "
18. From the summit of one ischiatic tuberosity to the same point on the opposite side	5½ inches.

* The antero-posterior diameter is generally measured from the upper and internal part of the symphysis pubis to the superior border of the sacrum; but M. Sedillot very justly remarks, that in many of the pelvis which are the seats of a double congenital luxation, the upper margin of the saerum, or, in other words, the well-marked prominence of the sacro-vertebral angle, is found far above the pubis, and the articulation between the first two pieces of the sacrum, is then on a level with the superior surface of this bone. Of course, in such a case, the true antero-posterior diameter of the abdominal strait would extend from the upper border of the pubis to the part of the sacrum found on the same level, and this interval, therefore, is the only important measurement. But this observation is not new, as it had previously been made by Bland, and repeated by Merriman, in the following note: "Although the sacrum be carried so far forward that it seems to reduce the antero-posterior diameter at the entrance of the excavation to two or three inches, if the bones were directly opposite to each other; yet the pubes being placed something lower than the greatest projection of the sacrum, and opposed to a part of that bone that diverges backward, the real distance between them may be much more considerable than to the touch it may seem to be. Whence it happens that in cases where the projection of the saerum has occasioned exceeding great difficulty in the beginning of the labour, opposing an almost insuperable bar to the entrance of the head of the child into the pelvis, by directing it too far forward

From these measurements it appears: 1st. That the transverse dimensions of the greater pelvis are considerably retracted by the flattening out of the iliac fossæ, which approximate each other to such an extent as only to leave an interval of eight and a half inches, whereas the normal distance is ten and a half inches. 2d. That the relation which exists in the normal state, between the antero-posterior and transverse diameters of the superior strait is changed; since the transverse diameter is somewhat shorter here than the antero-posterior one; whereas, in the ordinary state, it is nearly an inch longer. 3d. That an inverse change takes place at the inferior strait, the bis-ischiatic diameter being five and a quarter inches, while the coccy-pubic one is but three and a half inches.

These last modifications, says M. Sedillot, are easily explained, being the consequence of the unnatural position of the femurs in the external iliac fossæ; for individuals afflicted with a double luxation of this kind, walk with the legs wide apart, so as to bear and rest the heads of the thigh bones against the sides of the ilia; though the effect would still be the same, even if their progression were not performed in this manner, because the external, lateral, and superior surfaces of these bones, which usually incline outwards, will always be pressed upon to a certain extent, by the heads of the femurs, which have a tendency to straighten and carry them inwards. Whence the basin, from being thus compressed laterally, is elongated from behind forwards, and forms, in this latter direction, a more or less acute angle. The iliac fossæ, experiencing the pressure more directly, have yielded in a marked degree, though more at their middle than in front, because the head of the thigh bone is thrown far back, and compresses the middle more than the anterior part of these fossæ. The ilium is often rendered more straight and nearly vertical, instead of being bent outwards; and, should this phenomenon exist on both sides, it might interfere with the regular development of the womb; but if on one side only, it might occasion an obliquity of this organ in the opposite direction.

The anterior margin of the ilium also presents a singular disposition; for the conjoint tendon of the psoas magnus and iliacus internus muscles, which is inserted in the lesser trochanter, is then changed from its usual direction, and is carried upward by the ascent of the thigh bone, and, as a consequence, this tendon plays more deeply, and changes the direction of its groove; whereby the anterior-inferior spinous process is turned aside in a more or less sensible degree.

The retraction in the transverse diameter at the upper strait is evidently due to the lateral pressure made by the heads of the femurs almost perpendicular to this strait; and as a flattening in the transverse direction is necessarily accompanied by an elongation

over the pubes, yet when that direction has been altered by the crochet, or by any other means, and the head brought into the line of the centre of the pelvis, the conclusion of the labour has been frequently effected with very little exertion or force."—*Bland's Observations.*

antero-posteriorly, the sacro-pubic diameter is found augmented in a corresponding degree.

The examination of the inferior strait also exhibits a very curious phenomenon, just the reverse of what we have met with at the abdominal one; that is, there is a considerable increase in the extent of its transverse diameter, with a notable diminution in that of its coccy-pubic one. Here, also, the situation of the femurs must be referred to, in explanation of the circumstance; for these latter are then carried far upwards, outwards, and backwards, since their superior articular extremity has escaped up into the external iliac fossa; and they keep the surrounding muscles constantly tense (more particularly the quadrati, the gemelli, and the internal obturator muscles, which run from the ischiatic tuberosities to the extremity of the thigh bones), and thus drag the ischium outwards; the lower fibres of the obturator externus and adductor muscles, and the internal part of the articular capsule act in the same manner on the columns of the pubic arch; thereby producing a wide separation of the two ischia. The latter, in turn, draw on the greater and lesser sacro-sciatic ligaments, thereby creating a greater curvature in the inferior bones of the sacrum and coccyx, and consequently the diminution of the coccy-pubic diameter, as also a greater depth in the sacral concavity. The want of depth in the pelvic excavation depends on the same cause; for, when the ischium is drawn towards the external iliac fossa, the lower part of the pubic arch is necessarily bent out, and, as a consequence, the depth of the pelvis anteriorly is diminished. (*Sedillot.*)

The weight of the body, when erect, is the principal agent of this deformity; which essentially results, as just stated, from the tension exerted, from within outwards on both sides by the capsular ligaments of the two deformed articulations, which hold the trunk suspended, in a measure, between the thigh-bones; and the force exerted by these ligaments on the pelvis is equal in power to the tendency of the weight of the body to elongate them. Lastly, the retraction of the cotyloid cavity has some little influence over the change in extent, which the basin undergoes, though it explains but a very small part of the deformity. (*Bouvier.*)

The deformity is often irregular, or non-symmetrical, because the changes effected in the pelvis are more marked on one side than on the other; though, generally speaking, they are found to bear a relation to the degree of organization in the new joint; and, if any accidental articular cavity exists, they are more developed on that side.

A pelvis, which has been referred to by M. Gerdy in his learned report, read before the Academy, on congenital luxations, and which presents some very singular modifications, may be seen at the *Musée Dupuytren*: it only has one femur attached, which is fused outside of the anterior-inferior spinous process of the ilium on the left side. The anterior-superior spine of the opposite coxal bone is two inches higher than the left one, and both bones are fixed with an equal degree of solidity in these relative situations; the sacrum, though

very short, is quite broad, and the superior strait exhibits a modification similar to what has just been described; as to the inferior strait, it is very large in every direction, because the sacrum is exceedingly short, and the anterior pelvic wall is deployed, as it were, forward and downward on the same transverse and vertical plane, instead of being curved or bent downwards and backwards as in the normal state. (*Vide No. 252, Musée Dupuytren.*)

Lastly, where a single luxation exists, the modifications just described are found on one ilium only; and consequently the retraction is less considerable, or perhaps is scarcely observable. Nevertheless, as the os ilium, corresponding to the dislocated side, is more or less atrophied, a slight deformity in the straits, and even in the pubic arch will result; which latter then becomes more straight, and it, together with the ischial tuberosity on the same side, is carried more directly outwards.

We have only extracted from the memoir of M. Sedillot those peculiarities that seemed important to be known, though we trust that enough has been given to prove that Dupuytren was greatly mistaken, when he asserted that the phenomena of primitive luxations had no influence whatever over the development of the pelvis, and that the latter then offered no greater obstacles to delivery than it does in well-formed persons; the incorrectness of which assertion is doubtless sufficiently proved by the details into which we have entered. However, it must be acknowledged that in such cases the accouchement is seldom impossible, although it may be attended with some difficulties: at least, no instance has yet been recorded in which the child's expulsion could not take place without having recourse to a bloody operation on the mother or infant; which is most certainly owing to the fact that, in congenital luxations, the retraction takes place in the longest diameters, both of the superior and inferior straits.

c. *Lesions of the Inferior Extremities.*—The curvatures, so often met with in the lower limbs, do not always diminish their length in an equal degree; and this unequal shortening determines a variation in the pressure they make on the bottom of the cotyloid cavities; and, consequently, may affect the pelvis on the side where this is the greater. It is so true that the imperfect conformation of the basin is then dependent on a difference in the length of the lower extremities, that the latter may often be curved (provided they maintain the same length), without the pelvis being necessarily vitiated; and also, that where any inequality does exist between them, there is quite a constant relation between the direction of the depression, and the side corresponding to the shortest limb.

It is further possible, that a shortening of one of the legs, whether resulting from a fracture, a luxation, or an atrophy of the limb, may produce the same result; more especially if these accidents take place in early childhood, when the basin is still far from having acquired its full development. Persons affected with chronic diseases of one of these limbs, and therefore under the necessity of walking

with crutches, and of bearing the whole weight of the body on the sound leg, run the same danger. Nevertheless, this latter circumstance has not always such an unfortunate influence; for Dr. Campbell mentions that he had an opportunity of examining the body of a woman who had made use of a crutch since the fourth year of her age, in consequence of a disease in her right lower extremity; this person, who died some time after delivery, had a perfectly formed pelvis. (*Campbell*, page 249.)

Amputation of the thigh, in a young girl, particularly in early childhood, is likewise capable of deforming the pelvis: thus, for example, Madame Lachapelle found the superior strait, in a female aged eighteen years, reduced to a moiety of its extent on the right side, and distorted in totality on the opposite side towards the left thigh, which had been amputated four years previously. Indeed, we can readily imagine that, as the artificial limb only derives its point of support from the ischium, the acetabulum of the sound side will alone continue to be compressed by the weight of the body.

§ 3. PELVES DEFORMED BY ABSOLUTE NARROWNESS.

To complete our remarks on the causes of pelvic deformities, we have yet to sum up the various opinions that have been given forth, concerning those vitiated by absolute narrowness. Agreeably to most authors, the absolute retraction of the basin results from an arrest of development, whereby this part still retains, after puberty, the principal characters that it had during childhood, and it approaches in its form more or less closely to that of the male. But, as M. Nægèle remarks, if this were really the case, the relation of the diameters with each other, and the character of the pubic arch, should be such as are observed in the young girl, and the male. But all the known pelvises of this variety exhibit quite the contrary. Nor are they more in consonance with that of a rickety person; and, besides, the rest of the skeleton has none of the characters appertaining to this disease.

Wherefore it is certainly the wisest plan to say, with the illustrious Professor of Heidelberg, that we have no positive data concerning the causes that give rise to the general narrowing of the pelvis; and that such basins, as well as unusually large ones, should rather be considered as a freak of nature, belonging to the same category as a want of proportion in the head, which is not unfrequently found too large, or too small, relatively to the rest of the body.

ARTICLE III.

INFLUENCE OF THE VICES OF CONFORMATION IN THE PELVIS OVER PREGNANCY AND PARTURITION.

The vices of conformation may certainly have an unfavorable influence over the progress of gestation; for, as we have already stated in the article on abortion, where the retraction of the straits accom-

panies an enlargement of the excavation, the womb, finding a more considerable space than usual in the cavity of the lesser pelvis, may become developed, and remain there beyond the ordinary period; and we have considered this circumstance as one of the causes of abortion, from the impossibility of its getting subsequently above the superior strait; and, when treating of retroversion, we remarked that this displacement was singularly favored by an increased depth in the concavity of the sacrum.

When the transverse diameter of the greater pelvis is retracted by the straightening out of the iliac crests, as occurs in double congenital luxations of the femur, the womb's development is considerably impeded during the latter months of pregnancy; and this difficulty, according to Ant. Dubois, may prove a cause of premature labour. Where the straightening exists on one side only, the inconvenience is less; but still it may possibly contribute to the production of some uterine obliquity on the opposite side.

In general, however, with the exception of certain inconveniences, which evidently depend more on the extraordinary obliquity in the planes of the pelvis than on a retraction of its cavity (and to which we shall take occasion hereafter to revert), such retracted pelvises rarely interrupt the course of gestation; but they have a far different influence over the travail, to which we now ask the reader's attention more particularly.

The impediments to the delivery will usually be greater, as the vice of conformation in the pelvis is the more considerable; however, this proposition, although true in the majority of cases, is not absolutely so, since the degree of narrowing is not the only point that demands the accoucheur's attention; for, the child's position, the size of its head, the flexibility of the cranial bones, the force in the uterine contractions, and the variable degree of relaxation in the pelvic articulations, are so many important circumstances which claim his consideration. One woman, perhaps, is happily delivered at term, whilst another, whose pelvis offers the same dimensions, will require the intervention of art for her relief. The same woman may be spontaneously delivered of her first infant, and yet present such difficulties at the second accouchement, that the mutilation of the foetus may be deemed to be the only remedy for sparing her a bloody operation, without our thereby concluding that her pelvis had become retracted between these two pregnancies; for these differences might depend solely on the greater volume, or a less degree of reducibility in the head, or the bad position of her second child, etc. Most accoucheurs have observed facts of this nature, but we only present the following: A patient presented herself at *la Clinique*, in 1838, whose pelvis was only two and three-quarter inches in its sacro-pubic diameter; she was delivered in eighteen hours of a living infant, at term, the dimensions of which were nearly normal, and the head was scarcely deformed. Baudelocque relates having seen, at the amphitheatre of Solayres, the head of a foetus which was elongated in such a way, that its greatest diameter measured nearly eight and a half inches, whilst the bi-parietal one was reduced to two and

three-eighths, or two and three-quarter inches; and he speaks of another very similar instance; but in neither of these cases was the child's life compromised for a single instant. M. Martin, of Lyons, has known a rachitic woman to be delivered of a healthy infant at term, by the efforts of nature alone; where the autopsical examination showed that the antero-posterior diameter was only two and a half inches in extent (page 270). What rendered this case still more extraordinary, was the existence of scirrhous tumors in the substance of the uterine walls. The reducibility of the head, therefore, is sometimes excessive, but unfortunately it is almost impossible to appreciate this in a positive manner beforehand.

To this source of uncertainty, says Madaine Lachapelle, let us add that, in certain women, the degree of mobility in the symphyses does not permit a general separation of the bones (which, even if it existed, would scarcely enlarge the area of the strait or of its diameters); but rather a mutual gliding of the articular surfaces upon each other, a riding on the pubes, so that one of the innomina^ta advances to a range with the sacro-vertebral angle, whilst the other recedes to a greater or less extent. It follows from this arrangement that one of the oblique diameters at the superior strait, the one corresponding to the long diameter of the head, is notably increased; and the sacro-pubic one is also found augmented by the advancement of one of the coxal bones. Finally, continues this skillful midwife, it may be possible for both hip-bones to glide forward simultaneously, thereby enlarging still more the antero-posterior diameter.

In most cases of deformity, the child's position is far from being an indifferent matter: for when the sacrum, in being carried forward, is at the same time turned to one side, whereby one of the pelvis' lateral portions is more retracted than the other, who does not foresee that the labour may then be accomplished spontaneously, if the head presents in such a way as to offer its great occipital extremity to the well-formed side; and that, on the contrary, it would become impossible, if the occiput should be at the retracted one?

Where the contraction is so limited that it might possibly permit a spontaneous delivery, any unfavorable position of the foetus would greatly add to the existing difficulties caused by the malformation of the pelvis: if, for example, instead of presenting by the vertex, the child should offer its pelvic extremity, there would be reason to fear an arrest of the head above the superior strait, after the escape of the trunk; the slowness of its passage through this strait would not often warrant the abandonment of the accouchement to the resources of nature, both from the dangers the infant runs from a compression of the umbilical cord, and from the feebleness in the contractions of the womb, which, being nearly altogether emptied and retracted, no longer retains its contractile properties. (*Vide Presentation by the Breech.*)

We need scarcely add, in conclusion, that a proper degree of energy in the uterine contractions bears so prominent a part in the

accomplishment of labour, that it cannot be overlooked. In certain cases, for instance, where the basin is so little retracted that the child's delivery is still possible by the application of the forceps, it is evident that the frequent and strong contractions of the womb would render this instrument useless; again, the accouchement will terminate alone, in a case where the physician would have been obliged to interfere, if the pains had been too feeble or too slow.

We may conclude, therefore, that, in the question before us, there are a number of elements which may influence the result; and that, if the degree of narrowing in the pelvis is the most important point to be well ascertained, it is not the only circumstance upon which the obstetrician ought to base his determinations. For although the means of arriving at an exact knowledge of the extent of retraction are almost sure, yet, unfortunately, the same does not hold good with regard to the volume and the reducibility of the foetal head, or the mobility and possible separation of the pelvic symphyses; and it is impossible to calculate in advance all the resources of the organism, or to know how far the uterine efforts will go. From our ignorance, on most of these points, arise the uncertainties and hesitations which so often prove fatal either to the mother or the child; uncertainties and hesitations that never influence persons who are not versed in all the difficulties of our art, but which are well understood by learned and experienced practitioners, who have frequently been under the painful necessity of making a decision and of determining a question, whose solution might cost the lives of two individuals whom our mission is to save.

The foregoing reflections will, I hope, be sufficient to show, that what we are about to say concerning the influence of the vicissitudes of pelvic conformation over the accouchement is not positive and absolute, but is only applicable to the majority of cases.

Under the head of the difficulties and indications presented by these deformities, we shall admit, with M. P. Dubois, three principal divisions. The first is composed of pelvis, in which the retraction, in whatever part it may exist, still leaves at that part an opening of at least three and three-quarter inches in all its diameters; the second comprises those in which the retraction only leaves a canal, at the point it occupies, one or more of whose diameters will be three and three-quarter inches as a maximum, and two and a half inches as the minimum; and, lastly, we shall include in the third all the cases where the narrowing is such, that the dimensions of the resulting space will be under two and a half inches.

A. *Of the Pelvis having at least three and three-quarter inches in its contracted part.*—Here the labour, although in general longer, more difficult, and therefore more dangerous, both for the mother and child than in ordinary cases, may however be accomplished spontaneously; and, indeed, we might hope for such an expulsion in most cases. The slowness of its progress is more particularly observable in the dilatation of the os uteri, and in the process of the final expulsion;

for, during the first stage, the uterine contractions, though energetic and often regular, have but little action on the dilatation of the cervix ; the head is high up, and has no tendency to engage in the excavation, and it remains above the symphysis pubis against which it is strongly applied, being thrown forwards by the prominence of the sacro-vertebral angle. Indeed, it is highly probable that the extreme slowness in the dilatation is attributable to this latter circumstance ; for the lower front part of the womb is so compressed between the child's head and the pubic symphysis, that the longitudinal fibres of the body can scarcely act at all on the circular ones of the cervix, notwithstanding the energy of their contractions ; for we often find, after the head's volume has been diminished by a perforation of the cranium, whereby this compression is relieved, at least in a great measure, that the dilatation that was hitherto stationary is now observed to progress very rapidly.

As to the modifications that take place in the period of expulsion, they vary according to the seat of retraction ; for instance, when the superior strait is the place of deformity, the engagement of the head might be so much retarded that it could only succeed in clearing this obstacle under the influence of the most powerful contractions ; though, should these be sustained, the labour would terminate happily. But if, as is sometimes observed (*vide Pathol. Anat.*), the corresponding diameter of the inferior strait is simultaneously enlarged, the child's head, after having surmounted the difficulties offered at the upper one, will not find a sufficient degree of resistance at the perineal strait to moderate the rapidity of its descent ; and, consequently, it might strike violently against, and lacerate the perineum ; the disastrous consequences of which are well known.

Where the superior strait retains its normal dimensions, the inferior one alone being retracted, the head descends rapidly enough into the excavation, but it can only clear the last parts of the canal with the greatest difficulty ; for, as the dimensions of the lower strait are in general somewhat smaller than those of the upper, it follows that the same degree of retraction here is much more unfavorable to the delivery, and more often requires the application of the forceps.

Finally, where the two straits are retracted in the same degree, all the causes of difficulty just mentioned are found conjoined. Most frequently, the head succeeds in passing the superior strait ; but, having reached the excavation, and being unable to advance any further, it there remains wedged in until the exhausted or enfeebled forces are sufficiently renovated to effect its delivery. During all this time, the head, which had been forcibly compressed in order to clear the upper strait, and had its dimensions reduced by the overlapping of the parietal bones, gradually regains its natural size, now that it has entered a larger space, departing also from the conical shape it had acquired in the first stage, as its delay there is the more prolonged, and, consequently, meeting with new obstructions at the inferior strait, which are so much the more difficult to overcome as the uterine forces are already the more exhausted.

These differences in the seat of retraction ought to be known, for

they will enable the accoucheur to avoid an error in diagnosis which otherwise he might very readily commit; for example, in the cases where the superior strait alone is retracted, the head only gets into the excavation after very long-continued pains, but then it clears the inferior one almost immediately afterwards; whereas the contrary happens when this latter is the only one contracted, and the attending physician, judging of the probable by the past duration of the travail, announces that the labour will terminate sooner or later, according as the head has descended more or less rapidly into the excavation; but he will most always deceive himself; because, in the former instance, the termination will be very rapid, though he believed it still distant; and, in the latter, it will be delayed far beyond the time that he had fixed.

b. *Where the Pelvis has at least two and a half inches in its contracted part.*—A spontaneous expulsion of the foetus is still barely possible, where there is from three and one-eighth to three and three-quarter inches in the retracted part; though in reflecting on the length of the head's smallest diameter, which at term is at least three and one-half inches, it must be evident that, in order to render the delivery practicable under such circumstances, the diameters of the cranial vault should present a great reducibility, and the contractions of the womb be strong and prolonged. But in an immense majority of the cases under three and one-eighth inches, the resources of art become indispensable, unless the child's parts should be softened by putrefaction, or the infant itself not have acquired the development it usually exhibits at the ordinary term of gestation.

c. *Where the Contracted Diameter is less than two and a half inches.*—This degree of retraction renders a natural labour at term physically impossible; because too great a disproportion exists between the dimensions of the canal and those of the body which has to traverse it; and no other alternative remains for the accoucheur than to augment the former by symphyseotomy, or to diminish the latter by embryotomy; unless, indeed, he should rather prefer to open for it a new and more easy route by practicing the Cæsarean operation.

As regards the prognosis, it is very important to distinguish a pelvis deformed by rachitis from one whose retraction is dependent on mollities ossium; for although, in the former case, the graveness of the prognosis is only in proportion to the degree of retraction, yet it is not exactly or always so in the latter. Here, indeed, arises the important consideration that the first effect of malacosteon is to produce an excessive softening in the osseous tissue, the deformity of the skeleton being consecutive thereto; but this ramollissement only reaches its *summum* of intensity by degrees, and the disease may be arrested in its progress, may be ameliorated, or even entirely cured under the influence of a proper treatment. Whence it is evident that, during the period of increase and that of its amelioration, which may extend over several years, the softening passes successively through different degrees; and this softening,

where it happens to exist at the time of labour, furnishes the practitioner a very valuable resource, whatever may be the degree of retraction. In fact it would appear, from the cases reported in the dissertation of M. Spengel, that the bones often retain, at the moment of delivery, a sufficient degree of suppleness to enable them to dilate spontaneously, and to allow the expulsion of the foetus, or, at least, its artificial extraction. Thus, in a case furnished by Homberger, the sacro-pubic diameter was scarcely two inches in length; nevertheless, after having ascertained the flexibility in the bones caused by the malacosteon, he declared that the delivery might be effected by the powers of nature. He ruptured the membranes at the end of twenty-four hours; then, after waiting as much longer, the engagement was sufficiently advanced to enable him to apply the forceps; when, by the aid of powerful tractions, he succeeded in bringing away a girl who lived four weeks. In another woman, whose sacro-pubic diameter was two and a quarter inches (French measurement) at the most, Hasslocher, a physician of Landau, was enabled, by the aid of external pressure, to make the child's head engage in the cavity of the pelvis; he then applied the forceps, and found that only a moderate effort was required to deliver a dead child, weighing six pounds and a half.

Facts of this nature are certainly consolatory, and they well merit attention; but, unfortunately, it is a very difficult matter to recognize that precise degree of flexibility in the bones, under which there is no reason to hope for a spontaneous dilatation; for, between the first stages of softening in them and that advanced period when they scarcely have the consistence of a gelatinous pulp, there are numerous intermediate degrees; and the great difficulty consists in determining the cases in which we can trust to the efforts of nature, and those in which nothing can be hoped from this source. A misplaced confidence might be attended with the most serious consequences; for, on the one hand, a prolonged delay may compromise the child's life, that might have otherwise been saved, by resorting to the Cæsarean operation at the most favorable moment; and on the other, the tentatives uselessly made with the forceps expose the mother to the greatest dangers; for bones affected by this disease are, it is true, most generally softened, but sometimes it happens that the affection has only rendered them more friable, and, of course, any tractions made by the instrument, in such cases, might give rise to dangerous fractures. It would, therefore, be highly desirable to have a rule of procedure, but in the present state of our science it is impossible to lay down any positive one; and the accoucheur must found his opinion on the whole of the phenomena exhibited in the particular case. "Without supposing," says M. Spengel, "that it will be possible to ascertain, positively, to what extent the softening in the pelvic bones has advanced, we believe that, by paying attention to the symptoms which preceded and those that accompany the accouchement, it may be determined in quite a probable manner. We have collected forty cases of general mollieties ossium that occurred in females; in nineteen of which the time

when the pains first began is not noted, and no conclusions therefore can be drawn from them; but, in twelve cases, the first pains appeared during the lying-in, in two others, shortly after the accouchement, and in the remaining seven during the course of gestation; and, whenever the period has been carefully noted when the pains, after having been once calmed, were aggravated anew, it has been found that this exacerbation came on during a new pregnancy. Whence we may suppose that the ramollissement in the bones is more considerable towards the end of gestation than it was before its onset. Therefore, when the alteration progressively increases until term, and the difficulty in the patient's movements or the pains exhibit no diminution, we believe the degree of softening may be regarded as bearing a relation to the violence and duration of these symptoms. Further, by resorting to the manual exploration, we are enabled to detect in some cases a softening to such an extent that the bones yield to the pressure of the fingers. Under such circumstances, the accoucheur may doubtless rely on a spontaneous delivery, or at least on the success of a prudent application of the forceps; which latter should then be made rather than resort to the Cæsarean operation, which is so grave at all times, but is still more so when practiced on women affected with malacosteon."

Independently of the difficulties which the retractions of the pelvis give rise to in the accomplishment of the mechanical phenomena of labour, they often become the source of serious accidents to the mother, and subject the fœtus to the greatest dangers. For, by forming an invincible obstacle to the head's passage, they expose the woman to a rupture of the womb or bladder, to a violent contusion, and the consecutive inflammation of those organs and of the peritoneum, and, lastly, to a febrile or adynamic state, which is serious enough of itself to cause her death before the delivery is effected; since this condition is the most frequent source of mortality in those patients who are not relieved. Again, even where the accouchement has taken place either spontaneously, or artificially through the natural passages, the duration of the preceding travail and the pressure of the child's head upon all the soft parts lining the straits and excavation, expose these latter to prolonged contusions, which are most frequently followed by gangrene; whence we have following in their train utero-vesical, or vesico-vaginal fistulas, etc. etc., according to the point that has been more particularly compressed. The head's forced engagement in a contracted pelvis often determines the separation of the symphyses, from which inflammations and suppurations, that are often very tedious in their cure, result as the immediate consequences, and a great mobility in the pelvic articulations, limping, and sometimes even an inability to walk or stand, as the remote ones. (*Lachapelle.*)

As regards the child, the slowness of the travail may evidently occasion its death; for, in the case before us, the head being retained above the superior strait does not prevent the discharge of the amniotic liquid by plugging up the os uteri, and this nearly all escapes; and, consequently, the fœtus is subjected, soon after the membranes

give way, to the direct pressure of the contracted uterine walls during all the time necessary to the termination of the labour. The cord also is very frequently compressed, either in the uterine cavity, between its parietes and the child's trunk, or subsequently in the excavation where it may have slipped; which descent of the cord is here singularly favored by the elevation of the head. This latter itself having to support all the pressure from the resistance offered by the pelvis, is exposed to very unequal compressions, which may fracture the cranial bones or wound the cerebral matter. Lastly, when the foetus presents by the pelvic extremity, the violent tractions sometimes necessarily made on the trunk, for the purpose of disengaging the head, may produce a luxation of the cervical vertebrae or a tension of the spinal marrow, both of which speedily prove fatal.

ARTICLE IV.

DIAGNOSIS OF THE PELVIC DEFORMITIES.

The circumstances whereby the existence of a vice of conformation in the pelvis may be recognized, have been divided into the rational and the sensible signs. The first include all those that may be learned from the previous history, and a general examination of the individual—her constitution, height, and physical strength; the second, on the contrary, are deduced from an external and an internal examination of the pelvis.

§ 1. RATIONAL SIGNS.

The accoucheur who may be called upon to decide on the good or imperfect conformation of a female, should, before proceeding to an exploration of the basin, inform himself minutely of all the antecedent circumstances which might throw any light on his diagnosis, or direct his subsequent researches. He ought to ascertain from the near relatives, all the accidents which the young girl submitted to his care may have met with in infancy; at what age she began to walk; whether standing in the erect position was easy, or even possible, in the early years of life; or whether, after having walked without any marked difficulty, she was subsequently afflicted with a weakness in her lower extremities; and, should there be an existing curvature of the spine or limbs, the period at which such incurvations were manifested is to be carefully ascertained; as, also, whether those in the lower extremities preceded or followed that of the spine. Where any limping is observed, he will endeavor to verify the information derived from the family, by examining whether this depends on a difference in the deformity of the two limbs; on the atrophy of one of them; on the flattening of the anterior pelvic walls; on an old or a recent affection of the femoro-coxal articulation; on a spontaneous or a congenital luxation, followed by the permanent displacement of the head of the femur; or whether

upon an old and imperfectly consolidated fracture; because the answer to all these questions will render the examination, which is afterwards to be resorted to, much more easy.

The history of the earlier years of life is particularly important, as it will not only enable us to divine the perfect or defective conformation of the pelvis with a tolerable degree of certainty, but will even serve to enlighten us as to the nature of the general affection that has produced the deformity. In fact, it would appear from the researches of modern pathologists that rachitis, properly so called, is a disease of childhood, though it is seldom observed in the infant at term; it generally begins about the eighteenth or twentieth month, and is rarely found after the age of puberty. Thus, in three hundred and forty-six cases, examined in this respect by M. Jules Guerin, its invasion took place as follows: in three cases, before birth; in ninety-eight, during the course of the first year; in one hundred and seventy-six, during the second; in thirty-five, in the third; in nineteen, in the fourth; in fifty, in the fifth; and in five children from the sixth to the twelfth year of life.*

From these and numerous other cases reported by Bouvier, Ruff, *et al.*, it is apparent that deformities occurring in infancy are nearly always of a rickety nature; whilst all the varieties of softening that take place in adult bones, as also all the disfigurements occurring in young girls about the period of puberty exclusively, are not caused by this disease. (*Guerin.*)

A rachitic origin of the deformity can, therefore, be almost constantly relied on where the disease that determined the latter existed during the early years of life; and this suspicion will be established, if it should appear (conformably to the law laid down by the orthopedists, and confirmed by M. Guerin) that the malformation proceeded from below upwards, and that the tibias, the femurs, and the spinal column had been successively affected. But if, on the contrary, the first ten years have passed away without any accident of the kind; and if, moreover, the patient has been happily delivered before, but has exhibited since that event all the phenomena of an acute ramollissement, the deformities may safely be considered as having been caused by malacosteon.

After attending to all these points, the accoucheur might proceed to a more careful inspection of the individual; and the vertebral column and lower extremities should particularly claim his attention; for he ought to bear in mind that rachitic deviations of the spine (and, when dating from early infancy, they will be nearly always rachitic) are almost constantly accompanied with a malformation of the pelvis; and that, on the contrary, the other varieties, more especially when they first occurred about the age of puberty, do not affect the normal regularity of the basin. It is also to be remembered that rickets may possibly incurvate the lower extremi-

* There is evidently an error in the text, but I give the statement as found in the original; the number designated for the fifth year is probably too high.—*Translator.*

ties without altering the pelvic cavity, though these two parts of the skeleton are most generally affected at the same time; as also that, even if the form of this cavity should remain intact after the disease is cured, it is not at all uncommon for a deformity to afterwards result in it from the unequal length of the lower extremities; particularly if this inequality is well marked, and has existed from early infancy; but if, on the other hand, the limbs, although curved, retain the same length, this consecutive malformation of the pelvis will not have taken place.

An attempt has been made to establish a certain relation between the direction of the curvature in the spine or lower extremities, and the particular species of malformation the pelvis may exhibit. For instance, the sacrum, being an assemblage of little bones, which are naturally consolidated together, is occasionally modified by incurvations that are continuous with those of the spine, and these are further kept up by the coccyx. Sometimes, the lateral inflexion of these two bones corresponds to the lumbar curve; though, more frequently, they describe an inverse curvature with one or two of the last lumbar vertebræ, and the point of the coccyx is then turned aside. Again, according to M. Hohl, the lateral inflexion of the lumbar column often determines a greater retraction of the pelvis on the side towards which these vertebræ lean.

Agreeably to the same author, the flexure in the femurs occasions a transverse retraction of the pelvis, and a consequent elongation antero-posteriorly, when these bones are curved forward; whilst their outward curvature is followed by a transverse enlargement; but if one bends outward, the other forward, a corresponding shortening will thence result in the latter direction. However, all these approximations must be substantiated by a more extended experience to deserve our confidence, although it would be improper in practice to neglect them altogether.

As to the relations that M. Weber has endeavored to establish between the dimensions of the cranium and those of the pelvis, they are not constant enough to merit any consideration whatever in an examination which requires so much precision.

Quite recently, M. Guerin, after having ascertained that rachitis proceeds from below upwards, and that the reduction in the dimensions of the bones follows the same progression, attempts to prove further, that the dimensions of a rickety bone being known, the size of other parts of the skeleton may be approximatively determined; and that the reduction in the three diameters of the pelvis in rachitic women, follows the diminution in the extent of its component parts, and that the degree of this reduction is intermediate to what takes place in the femur, and in the humerus.

These results, so valuable in themselves, had they been deduced from a large number of cases, are, unfortunately, based upon a very limited observation; and, consequently, have not all the weight that I hope they will hereafter acquire; for the great importance of being able to determine, with certainty, from the degree of retraction in the

femur and humerus, not only that the pelvis is deformed, but even the extent of the malformation must be self evident.

In conclusion, it is apparent that the rational signs just spoken of can only give us probabilities or approximations; but the indications presented by the vices of pelvic conformation demand an exact and a rigorous solution of all the questions of diagnosis appertaining thereto; because it is not on a mere probability that an accoucheur can venture to prohibit a young girl from marriage, or can determine on the performance of an operation that mutilates the child, or exposes the mother to the most serious dangers. Such a decision can only be made after a thorough and minute examination of the exterior form, and the internal dimensions of the pelvis; and this examination alone, can enable him to detect those sensible signs which afford a positive certainty.

§ 2. SENSIBLE SIGNS.

The accoucheur should not content himself, therefore, with the foregoing characters, but he ought to seek, in the mensuration of the pelvis, for the elements necessary to his diagnosis. This process is performed on the exterior of the basin, or it may be done equally well within; in the former case it constitutes what obstetricians have termed the external, and in the latter the internal pelvimetry.

When we described the pelvis, in the early part of the work, we only pointed out the dimensions that were absolutely necessary to the full comprehension of the mechanism of natural labour; but we must now supply that voluntary omission; for, in addition to the distances then given, there are several others which are indispensable to the practice of pelvic mensuration; and we give the following as the average of a well-formed basin, viz. :—

1. From the anterior-inferior spinous process of one ilium, to the same point on the opposite side	$8\frac{1}{2}$	inches.
2. From the anterior-superior spinous process of one side to the same point on the other	$9\frac{1}{2}$	"
3. From the middle of the iliac crest of one side to the same point opposite	$10\frac{1}{2}$	"
4. From the middle of the iliac crest to the tuber ischii	$7\frac{1}{2}$	"
The superior strait divides this distance into two equal parts, whence the lateral portions of the greater and lesser pelvis are each	$3\frac{3}{4}$	"
5. From the anterior-superior part of the symphysis pubis, to the apex of the first spinous process of the sacrum	$7\frac{1}{2}$	"
From which $2\frac{1}{2}$ inches are to be deducted for the thickness of the base of the sacrum, and $\frac{1}{2}$ an inch for that of the symphysis; therefore, leaving for the sacro-pubic interval	$4\frac{1}{2}$	"
6. From the tuber ischii of one side to the posterior-superior spinous process of the opposite ilium, the mean extent, in an ordinary pelvis, is	7	"

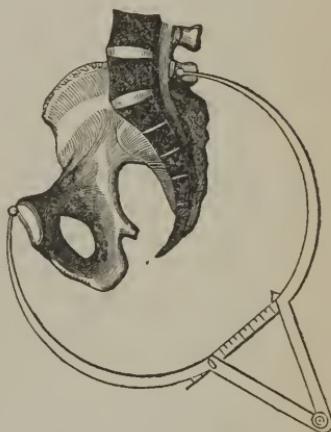
7. From the anterior-superior spine on one side to the posterior-superior spine of the other, the mean is	8½ inches.
8. From the spinous process of the last lumbar vertebra, to the anterior-superior iliac spine of either side, the mean is	7 " "
9. From the trochanter major of one side to the posterior-superior spinous process of the opposite one	9 " "
10.* From the middle of the lower border of the symphysis pubis to the posterior-superior spinous process on either side	6¾ " "

For the purpose of ascertaining the dimensions just given, in the living female, as well as the principal modifications they may have undergone, accoucheurs have invented a great number of instruments, to which the title of *pelvimeters* has been applied; but I can only allude here to those in most common use.

The pelvimeter, or callipers, described by Baudelocque (Fig. 72), consists of two metallic blades bent in a semicircular form, so as to embrace the largest part of the pelvis in their concavity. The extremity of each one is terminated by a lenticular button, which is intended to be applied at the end of the line that is to be measured; a small rule, marked by a graduated scale, traverses the branches just at the point where the curved blade joins the straight handle, and shows the degree of separation at the points exactly. This rule shuts up in a deep groove along the handle of the callipers. The instrument is applied externally, and may prove very useful in estimating the measurements above given.

In skillful hands, the pelvimeter of Baudelocque may furnish very satisfactory results; but it must be acknowledged that it is far from offering that degree of certainty which its inventor anticipated, even in the determination of the antero-posterior diameter of the superior strait, the one, of all the pelvic diameters, which seems the best adapted to this mode of exploration; for, although one of the buttons can readily be applied at the upper front part of the pubic symphysis, after having carefully pushed aside the soft parts, yet it is far otherwise with regard to placing the other one just over the

Fig. 72.



Baudelocque's callipers applied to the measurement of the antero-posterior diameter of the superior strait.

* The last five measurements are taken from the Memoirs of M. Nægèle, translated by M. Danyau. We shall hereafter revert to their importance, in connection with the diagnosis of the oblique-oval pelvis.

point corresponding to the spinous process of the first piece of the sacrum;* and, consequently, the difficulty of determining this latter point and the thickness of the soft parts exactly, renders this mode of mensuration very uncertain in its results. But, even supposing the instrument could be properly adjusted, the results thereby obtained would be scarcely less conclusive. When the pelvis is well-formed, there should be, it is said, seven and a half inches between those two points; from which two and a half inches for the thickness of the sacrum at its base, and half an inch for that of the symphysis pubis, are to be deducted. But, the question at once arises, are the pelvic bones always uniform in thickness? or must we still deduct three inches for the substance of the bones, in cases of rachitis, where the skeleton exhibits a more or less marked arrest in its development? or how are we to know to what extent this influence of rachitis over the growth of the osseous system is carried? And may not the thickness of the sacrum at its base, instead of exhibiting the normal average of two and a half inches, be reduced to two, one and a half, or even one inch?†

If such sources of uncertainty exist in respect to the measurement of the sacro-pubic diameter, what must it be with regard to determining the transverse or oblique ones by the pelvimeter? For, is the interval between the anterior iliac spines always the same? In the normal state, that extending from the middle of the iliac crest on one side to the same point opposite is ten and a half inches, just double the length of the transverse diameter of the superior strait; but, it is well known the iliac fossæ may vary in their concavity, and that the crests may approach more or less closely towards

* I have repeatedly made such attempts, and have so rarely succeeded in adjusting the point of the callipers over the spot behind where it is directed to be applied, that I have rather attributed those eases to chance, in which the touch did not set aside my first diagnosis; and I will add, further, that I have often known M. P. Dubois to abandon this mode of exploration after frequent ineffectual trials, and to rely wholly upon the vaginal examination.

† We have had opportunities of measuring a great number of pelvis that were deformed in various ways and in different degrees, says Madame Boivin, which, in the thickness of the walls in question, departed from the three inches assigned to them by Baudelocque, from a third of an inch to an inch each, either larger or smaller. This difference in thickness was sometimes observed in the pubis, at others in the base of the sacrum, and again in both of these bones at the same time. Besides, in more than a hundred well-formed basins, covered by all their tissues, which had not been altered by disease in any way, we have noticed considerable variations both in the volume and the thickness of the parts forming the antero-posterior diameter at the superior strait.

Madame Lachapelle has found the saerum alone nearly three inches thick, in many well-made pelvis, whilst in some deformed ones it scarcely measured two inches.

"I consider the results," adds this skillful midwife, "that are obtained in measuring the transverse and oblique diameters of the strait, by taking certain portions of the iliac crests, the great trochanters, the ischial tuberosities, etc., for the points of departure, as very fallacious: Because, 1. In the best-formed women, the iliae crests are sometimes inclined towards each other, and at others are turned outwards, so that both are everted, and a cylindroid variety may exist in natural pelvis; 2. The great trochanters are more or less separated, according to the variable direction and length of the neck of the femur, etc."

a vertical or a horizontal direction, without altering the form of the abdominal strait. And, therefore, the supposed relations between these two distances exhibit such frequent anomalies that we cannot place any confidence in the conclusions endeavored to be established therefrom.

Again, where one point of the callipers is placed on the external surface of the trochanter major, and the other on the salient part of the opposite sacro-iliac articulation, with a view of determining the oblique diameters, no account is made of the numerous variations in the length and inclination of the cervix femoris, in the depth of the cotyloid cavity, or in the thickness of the soft parts behind.

Consequently, the employment of Baudelocque's pelvimeter can only give approximate results; but it is not the less an useful instrument in those cases where it would be impossible to introduce a foreign body into the vaginal cavity; for instance, the internal exploration is not permissible in young girls, and then we must resort to the use of the callipers. Fortunately, at such times, the diagnosis need not be very precise, and a few lines more or less cannot affect the decision of the physician.

But the case is far different when the woman is pregnant or in labour, for then it is necessary to learn the dimensions of the pelvic cavity with the greatest exactitude. For this purpose, accoucheurs have devised various instruments, which they have designated by the title of *internal pelvimeters*.

The most ancient of all is the one invented by Coutouly, which closely resembles, in its general appearance, the instrument used by shoemakers, during the last few years, for taking the measure of the foot: it is composed of two iron rules, which slide on each other, and each having a short plate fixed at a right angle on one of its extremities. When it is introduced into the vagina, the two rules are slipped along each other, so as to get one of the plates against the sacro-vertebral angle, and the other just behind the posterior face of the symphysis pubis. One of these rules is marked by a scale, which indicates the degree of separation of the two plates, and, consequently, the length of the sacro-pubic diameter.

The use of this instrument is attended with such numerous inconveniences, as to have banished it almost entirely from practice. Its application is difficult; it distends the vaginal mucous membrane beyond measure, and this distension is often very distressing to the patient; and the extremity of the plate that is intended to be applied on the sacro-vertebral angle, is liable to slip and to become displaced; besides which, the organs situated in the excavation oppose its free use.

Madame Boivin endeavored to obviate most of the objections against Coutouly's instrument, by substituting a new one, which she called an *intro-pelvimeter*; which, although bearing a general resemblance to the former, differs essentially, in having its two constituent branches simply articulated, so that they may be unfastened and introduced separately; the one into the rectum, the plate of

which is to be applied against the sacro-vertebral angle, and the other into the vagina, so as to place its vertical part behind the symphysis pubis. This instrument is perhaps less painful to the patient, and not so liable to be displaced as the other, but it will not furnish us any more accurate results. Besides, the introduction of a foreign body into the rectum is so disagreeable to most women that very few are willing to submit to it; for where, indeed, is the young girl (and Madame Boivin recommends it particularly for virgins) who could ever consent to its employment?

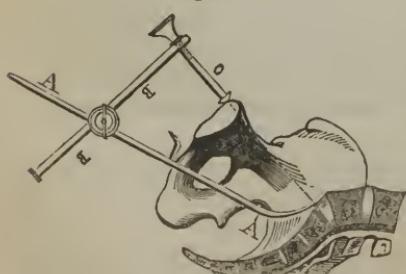
But it is unnecessary to allude here to all the other pelvimeters that have been proposed; and I shall only bring forward the one invented by Stein, which I should adopt rather than the preceding, because it is more simple and of more easy application; being merely a metallic stem, of the length and size of the female catheter, provided with an index, and having the metrical divisions marked on one of its surfaces. It is employed by passing its extremity along the forefinger, previously introduced into the vagina, until it reaches the sacro-vertebral angle; the external part is next pressed upwards, so as to bring the graduated face in contact with the lower portion of the symphysis pubis, and then, by means of the index, the point on the stem corresponding to the symphysis is marked. The instrument is subsequently withdrawn, and all that part of it beyond the index shows the length of the sacro-pubic diameter, or rather the interval existing between the sacro-vertebral angle and the inferior part of the pubis. (Vide *infra* for the difference.)

However, Stein's pelvimeter may be replaced by any straight rod whatever, upon which the finger will take the place of the index.

Many very ingenious instruments have been proposed during the last few years, for the purpose of obviating the various objections we have urged against those just mentioned: such are Wellenbergh's, a description of which is given by M. P. Dubois in the twenty-third volume of the new edition of the *Dictionnaire*; and, more particularly, the one announced quite recently by M. Van Huevel, a professor at Brussels. This latter, in my estimation, has incontestable advantages over all the others; and I feel warranted in recommending its more general use.

It is composed of two rods; an *internal* or vaginal one (Fig. 73,

Fig. 73.



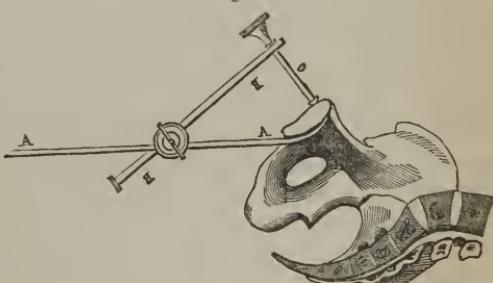
The mensuration of the sacro-pubic diameter with M. Van Huevel's pelvimeter.

A A), flattened like a spatula at each extremity, and having, about the middle of its upper face, a small blunt hook, or catch, the concavity of which looks towards the outer extremity; the other, or *external* one, B B, is traversed at the upper end, and perpendicularly to its direction, by a long screw, c, which, on being turned, pushes backwards. These rods are held together by means

of a nut, or articular box, thereby forming a kind of compass, the legs of which can be lengthened out or shortened at pleasure, and can likewise be moved in every direction; when a turn of the central screw in the nut presses them against each other, and retains them firmly in any desirable position.

When this instrument is to be applied, the woman reposes on her back, having the legs as well as the thighs flexed and separated. We then begin by ascertaining, both exteriorly and interiorly, the exact situation of the pubis' upper border; marking the skin with ink at the point corresponding to the middle of this border. The ileo-pectineal eminence on each side, just beyond the course of the crural artery, is next sought out and marked in the same way; so that the anterior extremities of the sacro-pubic and the two oblique diameters of the superior strait are indicated by the three ink spots on the skin, which are afterwards easily found. This being done, one or two fingers of the left hand are introduced into the vagina, and placed on the angle of the sacrum; and then, with the other, the curved extremity of the vaginal rod is conducted along and under these fingers, which support it against the promontory, while the thumb of the same hand, pressed into the blunt hook, firmly retains it on the exterior. The right hand, which hitherto held the instrument, now turns the long screw, c, in the external branch, the button of which rests on the ink spot made upon the mons veneris. While the operator thus holds the two branches in their respective positions, an assistant tightens the screw in the articular nut; when the instrument, being thus fastened, is carefully withdrawn (Fig. 73), and the distance between the two points, that is to say, the interval which separates the promontory from the anterior face of the pubis, is ascertained by a scale. This distance being known, the branches are rendered movable by unfastening the articular screw; and the operator again carries the left fore-finger into the vagina behind the symphysis pubis, to which point he conducts the extremity of the vaginal branch (its concavity being in front), by slipping it along the palmar surface of this finger, and he sustains it there by one hand, whilst with the other he replaces the screw of the external branch upon the ink spot on the mons veneris; taking care to avoid pressing more strongly than in the first operation; for it is only requisite to indent the skin without depressing it. The assistant again tight-

Fig. 74.



The mensuration of the symphysis-pubis by the same instrument.

ens the screw in the nut, and the operation is completed. (Fig. 74.)*

In order to withdraw the instrument, which now comprises the thickness of the pubic region, the screw c of the external branch is unfastened, and again exactly replaced in the same position after it is withdrawn. This distance is also measured, which, deducted from the first, gives a remainder that extends from the sacro-vertebral angle to the posterior face of the pubis, or more properly speaking, the sacro-pubic diameter.

The oblique diameters can be obtained precisely in the same way. The index and middle fingers are carried into the vagina, and their extremities placed on one of the sacro-iliac articulations, or even, if this cannot be reached, on the promontory of the sacrum; the end of the vaginal branch is slipped up there in turn, and then the button of the screw c is fixed on the ink spot corresponding to the right or the left ileo-pectineal eminence. The branches having been fastened in this position, are gently withdrawn from the woman's parts, and the distance between their points is taken by a graduated scale. In a second operation, the thickness of the cotoyloid wall is ascertained by conducting the vaginal branch along the fingers behind this cavity, as far as the brim of the pelvis, and by replacing the button of the external branch over the ink spot corresponding to the ileo-pectineal eminence. Is it necessary to repeat, that the soft parts in the groin are not to be depressed, and that the direction must correspond with the plane of the abdominal strait? The branches are subsequently fixed, and extracted by turning back the screw c, as described above; when, by deducting this second thickness from the first, the remainder will show the extent either of the oblique diameter, or that of the sacro-cotoyloid interval, according as the vaginal branch had originally been placed on the sacro-iliac symphysis or upon the promontory of the sacrum.

We may observe here that the opening between the promontory and the cotoyloid wall is the most essential to be known in cases of oblique vitiation; for the sacro-iliac articulation is never deformed (saving where an exostosis or some other tumor is developed on its surface); but it is rather the base of the sacrum, or the cotoyloid cavities which project into the hollow of the excavation. In fact, the pelvis sustains the vertebral column behind, while in front and laterally it rests on the thigh bones; and, therefore, it lies between two forces which, in the erect position and in walking, have a continual tendency to depress this osseous ring at the three points indicated. Whence it follows that, if there is any ramollissement, there will be a forward projection of the sacral angle, or a pressing inwards of the acetabula; that is to say, a retraction of the antero-posterior diameter, and the right and left sacro-cotoyloid intervals, which, in the normal state, only present from three to three and three-quarter inches in extent.

* If the hook should impede the sliding of the branch b n, it might be removed.

As regards the external mensuration, we can convert the pelvimeter into a common compass for the inferior strait, by taking the handle part of the two branches, and properly adjusting the nut; these being placed on the tuberosities of the ischia, or one at the point of the coccyx, and the other under the pubic arch, we are enabled to take the transverse and the antero-posterior diameters of this strait directly.

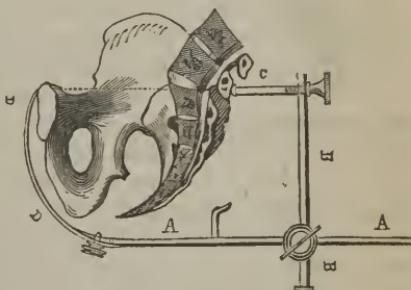
Lastly, by adding an additional piece to the apex of the vaginal branch (Fig. 75, D D), we form a species of callipers similar to the mecometer of Chaussier. This piece is first flattened out like a spatula, and then curved; and its concavity is placed along the anterior surface of the pubis; the branch that supports it, passes backwards between the woman's thighs; and the button of the screw c, traversing the other branch, is pressed on the spinous process of the last lumbar vertebra. The operator holds the extremities of the instrument in his two hands, whilst an assistant tightens the screw in the articular nut, and it is then disengaged by turning the screw c backwards, when necessary, which is returned to its place before measuring the interval between the points with the scale. (Extract from the *Memoir of M. Van Huevel*.)

But, after all, the hand of an accoucheur, accustomed to practice the touch, is certainly the best and most satisfactory of all pelvimeters; for, with the exception of a few rare cases, in which I would give the preference to the instrument last described, it is always possible to ascertain exactly by it the external form of the pelvis, and also, by its introduction into the vagina, the perfect or defective conformation of the cavity.

By the exterior palpation, we are enabled to learn the external characters of the pelvis, to find out the interval that exists between the two iliac crests, and to measure the depth of the anterior, the posterior, and the lateral walls of the basin; and this might possibly be all-sufficient; although, in our opinion, it is better to resort to the callipers of Baudelocque for the external mensuration.

It is more particularly in the appreciation of the dimensions of the cavity, the straits, and the excavation, that the hand introduced into the parts serves as a sure and faithful guide. It is not even necessary to pass the whole hand into the vagina, for the introduction of one or two fingers is usually quite sufficient; in fact, we ought to be satisfied with this, when the woman is not in labour, since the entrance of the entire hand would often prove very painful.*

Fig. 75.



The same instrument converted into a pair of callipers.

* It is a great mistake, says M. Guillemot, to suppose that it is possible to

The following is the proper mode of using the finger: the indicator having been passed into the vagina, is directed upwards and backwards towards the sacro-vertebral angle,

Fig. 76.



The mensuration of the sacro-pubic diameter by the finger.

which is easily recognized by its prominence, and by the transverse depression formed at the lumbo-sacral articulation. When the extremity of the finger is well applied against this part, the wrist is carried upward and forward, until the radial border of the finger comes into contact with the lower margin of the symphysis pubis; when the index of the other hand marks this point with the nail (the precaution having previously been taken to separate the labia-externa and the nymphæ); the finger is then withdrawn and placed on a scale, whereby the distance from the sacro-vertebral angle, upon which its extremity was applied, to the inferior part of the symphysis pubis is very correctly ascertained. But this oblique line is longer than the antero-posterior diameter of the upper

strait, which terminates in front, on the posterior-superior part of the symphysis; consequently, the excess must be deducted; and, by subtracting four or five lines for a large pelvis, and three to four for a small one, we shall have very nearly the extent of the sacro-pubic interval. With regard to the exact number of lines to be deducted, the attention should further be directed to the thickness, the length, and the more or less marked obliquity of the symphysis; which circumstances can easily be determined by the touch.

measure the length of the sacro-pubic diameter, by the introduction of a single finger into the vagina. This result has never been effected when the diameter has exceeded two and a half or three inches in length; and the dimensions of this strait can only be correctly obtained by using the whole hand.

Like M. Guillemot, we believe that the hand should be introduced, whenever this can be done without causing too much suffering to the patient; but we have elsewhere stated that this was often very painful, even at the moment of labour; and we will add, that at any other period it would appear useless, since the finger alone, by depressing the perineum, might measure as far as three and a half inches, unless there was an unusual resistance at this part, and beyond this a natural delivery is possible; or, at least, if the intervention of art should become necessary, it could always be terminated favorably to the lives both of the mother and child; and, therefore, nothing need be done until the time of parturition.

During labour, says M. Velpeau, we can, if necessary, introduce the entire hand into the vagina; the thumb and index finger are then separated, so as to place the one on the sacro-vertebral angle, and the other behind the pubis; the hand is withdrawn while in this position, and, by the aid of a measure, the dimensions of the sacro-pubic diameter are determined within one or two lines. I have sometimes used the index and middle fingers, carried high up into the vagina, with advantage; and then, after having separated them as much as possible, and placed their extremities on the diameter that is to be measured, two fingers of the other hand are inserted between their bases, to prevent them from changing their relations while being withdrawn from the woman's parts. But these directions, given by M. Velpeau, appear to us impracticable at the superior strait, and equally so as regards the bis-ischiatic interval.

The finger introduced into the parts will also be able to appreciate the extent of the antero-posterior diameter of the excavation ; for it can very readily pass over the whole front surface of the sacrum ; and, consequently, can judge whether its anterior concavity is augmented or diminished.

Lastly, its extremity being applied against the point of the coccyx, the accoucheur should again elevate his wrist until the radial border of the hand is arrested by the lower part of the symphysis ; then, marking this point with the other forefinger, he should withdraw the hand and apply it to a graduated scale, and he can thus ascertain very correctly the extent of the coccy-pubic diameter ; further, by pressing gently on the point of this bone, he can judge very readily of the degree of mobility in the sacro-coccygeal articulation. In cases of deformity caused by the excessive length or the unusual obliquity in the pubic symphysis, the direction of the vulvar opening will be changed, and the latter will be found situated much more posteriorly than in well-formed women.

Although the results furnished by the touch are perfectly satisfactory as regards the antero-posterior diameters, it is far otherwise with the transverse and oblique ones, particularly at the superior strait ; for the extent of these can only be judged of approximately, and we can do nothing more than verify with the finger the dimensions obtained by the external mensuration. The finger, when entered, is to be carried in the direction of those diameters, and the accuracy of the result thereby obtained will depend on the experience and tact of the accoucheur. However, we shall soon have occasion to be more explicit on this point, by extracting from the works of MM. Nægèle and Danyau the results of their researches.

As to the transverse diameters of the inferior strait, their dimensions can evidently be ascertained by the aid of the fingers.

Again, the educated finger will give a very just idea of the length of the symphysis pubis, the spreading and height of the pubic arch, the depth and normal configuration or deviation in the lateral walls of the excavation, and of the inward prominence of the ischiatic spine.

The existence of the various tumors that may obstruct the pelvic cavity, or greatly diminish the canal intended for the passage of the child, can be recognized by the finger alone ; for it can detect their nature, their softness, or resistance, and their mobility, or adhesion to the osseous parietes, or to the soft parts which line the latter, far better than any other instrument. But during parturition, the touch, which is so often useful at other times, may not prove adequate to this mensuration : for, if the degree of retraction is not very extensive, the head, after being arrested for a long time, may finally engage at the upper part of the excavation, and form a considerable rounded tumor just below the superior strait, large enough to prevent the finger from passing up to the sacro-vertebral angle ; and if the sacrum should then happen to be strongly pressed backwards, as frequently occurs, so that the antero-posterior diameters of the excavation and of the inferior strait are increased, the cause of the

head's arrest might be misunderstood, if the accoucheur does not bear in mind that, before engaging, it remained for some time above the symphysis pubis. The attention, however, will be awakened, if the finger, in traversing the sacrum's anterior surface from above downwards, detects the absence of its normal curvature.

Our assertion, that the accoucheur's finger is the most perfect of all instruments, was, therefore, well founded, though its importance must not be overrated. In fact, many practitioners have erred, in declaring, with Madame Lachapelle, that the best proof of a good conformation of the pelvis, is the impossibility of reaching the sacro-vertebral angle with the finger. Certain others, while concurring as to the imperfection of the other methods of exploration, equally err in supposing that an estimate, correct enough to guide us safely in practice, will be obtained by employing them simultaneously; because, there are some cases where the best known methods of exploration are inadequate, where the finger cannot reach the promontory of the sacrum, and yet where a mutilation of the foetus, and sometimes even the Cæsarean operation have been necessary.

The oblique-oval pelvis belongs to this class; and M. Nægèle, who described it with so much care, after having experienced the inefficiency of the means of diagnosis usually employed, has made some researches, with the view of overcoming this difficulty; for which purpose, he has taken points on the pelvis different from those described by most authors, which are easily accessible and recognizable; and he has carefully measured the distances between them in the normal state, as already pointed out (page 460, Nos. 6, 7, 8, 9, and 10). "In forty-two pelvis of well-formed females, we have found, says he, in a large majority of cases, but little or no difference between the two sides of the same pelvis, in the above-mentioned distances." M. Danyau, responding to the wish expressed by M. Nægèle, has repeated those researches in a great number of living and well-formed women, and the following are the conclusions at which he has arrived; namely, that in eighty females it appeared —

1. That the distance from the tuber-ischii of one side to the posterior superior-spinous process of the opposite ilium was the same on both sides in twenty-one persons; in fifty-one, the difference between the two sides was from one to three lines, and in eight only it amounted to four, five, and six lines; whilst, in the oblique-oval basins, the smallest difference was found to be one inch, and the greatest two inches.

2. That the distance from the anterior-superior spinous process of one side, to the posterior-superior iliac spine of the other, was the same in both halves of the pelvis in twenty-two females; in fifty-one there was a difference of one to six lines between the two; and in seven women only was this from seven to eleven lines. In the oblique-oval pelvis, the smallest difference between these sides was three-quarters of an inch, and the greatest two inches.

3. That the distance from the spinous process of the last lumbar vertebra to the anterior-superior iliac spine, was the same on both sides, in twenty-nine instances; in fifty-one, there was a difference

of one to seven lines between the two. But, in the oblique-oval pelvis, the least difference was eight lines, and the greatest an inch and a third.

4. That the distance from the trochanter major of one side to the posterior-superior iliac spine of the opposite one, was the same in eighteen cases (when measured comparatively on the two sides of the pelvis); a difference of one to six lines in this distance was found in fifty-seven; and in five only it ranged from seven to nine lines; whilst, in the oblique-oval, the smallest difference was half an inch, the greatest an inch and a half.

5. That the distance from the lower border of the symphysis pubis to the posterior-superior iliac spine, was the same on both sides in thirty-two women; in forty-six, the difference between the two moieties of the pelvis, in this respect, was from one to six lines; and in two, from eight to nine lines; but, in the oblique-oval pelvis, the least difference in this distance, taken on both sides, was seven lines, the greatest one inch.

It will, therefore, appear that, by a proper degree of care, and the aid of the measurements just given, we would be able to recognize the vice of conformation in question, by measuring the aforesaid distances on each side, and then comparing the results obtained from both.

But there is yet another method for detecting the oblique-oval pelvis, says M. Nægèle; that is, if a woman, having a well-formed basin, be placed with her back against any vertical plane, as a wall, for instance, so that the shoulders and upper part of her thighs be in contact with this plane, and then two plumb-lines be dropped, the one from the point corresponding to the spinous process of the first sacral or the last lumbar vertebra, and the other from the lower border of the symphysis pubis, when it will be found that the latter nearly or quite covers the first, that is to say, that a line perpendicular to the wall would intersect both of these plumbs at a right angle; but this is not the case in the oblique-oval basin. In fact, one of its essential characters is, that the symphysis pubis be deviated towards one side, and the sacrum towards the other, whence the middle of the pubic symphysis is opposite to the anterior sacral foramina, or even to the sacro-iliac articulation, on the non-anchylosed side. Consequently, when a woman, whose pelvis is thus deformed, assumes the position just indicated, and the plumb-lines are dropped at the designated points, the operator will find, by bringing his view perpendicular to the wall, that the line placed in front does not cover the posterior one; for the latter will deviate to the right or the left, according to the ankylosed side, and this deviation will be the more considerable, as the basin is the more deformed. (*M. Danyau's Translation.*)

ARTICLE V.

INDICATIONS PRESENTED BY THE VICES OF CONFORMATION IN THE PELVIS.

It is not our intention to treat, in this place, of the measures that it would, perhaps, be advisable to employ for the purpose of remedying the vices of conformation when they exist, for this subject belongs exclusively to the surgery of the osseous system; besides which, the various mechanical and gymnastic means hitherto used for correcting the deformities of the skeleton have had no efficacy in changing the form of the basin. But if nothing can be done by the physician to cure, he is, at least, not wholly destitute of resources where there is still a possibility of preventing such deformities. Thus, during the earlier years of life, especially, he ought to watch over all the circumstances that might influence the regular development of the skeleton with the most tender solicitude; he should relieve rachitic children from constriction or pressure of every kind, which might, in their variable attitudes, modify the pelvic circumference; they ought to be left in the recumbent position as much as possible; the nurse must not always have the child in her arms, as she is very apt to have, if not cautioned; and great care is requisite, not to permit them to walk too soon, not, indeed, until their bones have acquired a proper degree of solidity; and even then it should be in a moderate degree, and only in proportion as their strength increases. We must not yield, says M. Bouvier, to the chimerical fears of augmenting the debility by depriving children of a necessary exercise; for repose, on the contrary, is much better suited to that state of languor which they generally exhibit; and, besides, we may obtain, by passive motion, by exposure to sunlight, and by general movements in the horizontal position, a sufficient compensation for the state of inaction in which they are kept during a part of the day.

The indications presented by the vices of conformation in the pelvis, considered only with regard to the unfavorable influence they may exercise over the puerperal functions, will evidently vary with the degree of deformity. When studying this influence, we classified all the malformed pelvis in three categories, namely: all those having three and three quarter inches, at the least, in their smallest diameter, were placed in the first; in the second, we have included those presenting two and a half inches, at least; and in the third, those whose smallest dimensions are under two and a half inches: and, following the example of Professor Dubois, we shall still preserve this division in the study of the indications offered by the vices of conformation.*

* I am happy to state, that most of the following considerations and practical views are deduced from the excellent thesis which M. P. Dubois sustained with so much credit in the *concours*, at the close of which he was nominated. I con-

§ 1. WHAT IS TO BE DONE WHEN THE RETRACTION IS SUCH, THAT THE PELVIS MEASURES AT LEAST THREE AND THREE QUARTER INCHES IN ITS SMALLEST DIAMETER?

In such a case, the child may evidently present either by the vertex, the pelvic extremity, the face, or the trunk.

A. *Where the Infant presents by the Vertex.*—We have elsewhere stated that a spontaneous delivery is possible under such circumstances; and, consequently, that the wisest course is to wait and trust to the efforts of nature. But, where the uterine contractions are exerted for a long time after the membranes are ruptured in vain, and the amniotic waters are partially discharged, without the head's making any progress, an application of the forceps is the only remedy to which we can resort.* But the exact moment for the employment of this measure is to be determined with the greatest possible precision. As a general rule, we may wait six, seven, or even eight hours after the membranes give way, and after the os uteri is fully dilated; and then, if the strong energetic contractions have been uselessly exerted during all this time, to overcome the obstacle, it will be necessary to interfere, and to apply the instrument; though it will be advisable to act a little more promptly where the head, after having been engaged for some time in the excavation, is arrested by a retraction at the inferior strait; and the same would be true, if this strait were regularly formed, and the head's arrest were dependent on a feebleness of the uterine contractions occasioned by the previous efforts on the part of the organ, to make the head clear the contracted superior strait. It is unnecessary to add, that if any accident whatever, grave enough to endanger the health of the mother or the life of the child, should occur during the travail, it would demand a more prompt intervention of art. Most generally, the frequently repeated auscultation of the heart's pulsations would be satisfactory as to the child's condition, though even here only a certain degree of confidence can be reposed in this sign.

B. *Where the Infant presents by the Pelvic Extremity.*—When describing the mechanism of natural labour, we expressly recommended that no traction should be made on the pelvic extremity in breech presentations, with the view of avoiding the straightening out of the arms and an extension of the head; and we still insist on the same precept here. Nevertheless, in the case before us, if the largest part of the trunk is delivered, and the expulsion of the head is unusually delayed, it would be proper to hasten the termination

gratulate myself on being the first to give publicity to a work, that is, unfortunately, but too little known.

* It is highly important not to confound in practice the constantly increasing tumefaction of the hairy scalp with an actual descent of the head. For, when the labour is retarded, the scro-sanguineous tumor, formed by the soft parts, continually augments in volume, and its summit gets nearer and nearer to the vulva; and, therefore, unless the precaution is taken to get an osseous portion of this region, as a point of departure, the accoucheur might suppose that the head was traversing the excavation, and approaching the inferior strait, when, in reality, it did not move.

of the travail by a moderate traction on the body; for such attempts, if well conceived and well directed in the line of the pelvic axes, would prove sufficient in most cases to accomplish the delivery. If, however, they are ineffectual, it will then be necessary to apply the forceps.

c. *Where the Infant presents by the Face.*—Although face presentations may terminate naturally in the majority of cases where the pelvis is well formed, it is not the less true, as elsewhere demonstrated (page 342), that the travail is somewhat more painful to the mother, and is besides more dangerous for the child than in others. If, therefore, these difficulties, resulting from the position itself, are superadded to those which exist as a necessary consequence of the retraction, there can be no doubt that a delivery left entirely to nature, would be attended with a very considerable risk to the foetus. Under such circumstances, M. P. Dubois recommends—what appears to me to be the wisest course—the conversion of the face position into one of the vertex by flexing the head (vide *Cephalic Version*); and where the tentatives, made for the purpose of producing this conversion, are found to be insufficient to effect the object, it would be unnecessary to wait any longer, but to resort to the use of the forceps much sooner than would be proper in a vertex presentation.

d. *Where the Infant presents by the Trunk.*—The dangers to the child's life, when presenting by the pelvic extremity, in a retracted basin, would evidently deter us from resorting to the pelvic version in those instances where a presentation of the trunk should coincide with such a retraction; and, consequently, the head should first be sought after, and be brought to the superior strait (vide *Cephalic Version*); and it is not until after this operation had been attempted several times in vain, that the accoucheur would be justifiable in deciding on a delivery by the feet.

The pelvic version, in the case before us, is attended with some peculiarities that ought to be mentioned. For instance, where an undue development of the sacro-vertebral angle is the cause of the narrowing, it often happens, as before shown, that the base of the sacrum is turned a little to the one or the other side at the same time; that it is projected forward, thereby constricting one half of the pelvis much more than the other; and hence, in performing the evolution of the foetus, and drawing on its pelvic extremity, under such circumstances, it would evidently be requisite to turn its posterior plane towards the larger moiety of the basin, so that, at the moment when the head presented at the superior strait, its large occipital extremity would correspond to the non-retracted side.

It was stated above that when the foetus presented by its flexed cephalic extremity, it would be necessary to apply the forceps, if the uterine efforts were incapable of terminating the labour; but the particular variety of malformation that we are now treating of may modify the rule laid down, which was perhaps a little too absolute; for, in this case, the position of the head must greatly influence the accoucheur's determination. Let us take, for example, a pelvis whose sacro-ver-

tebral angle while projecting forward is turned to the right, so as to diminish the saero-cotyloid interval very considerably on this side; now, the intervention of art being judged necessary, if the head is placed in the left oecipito-iliae position, an application of the forceps will be the only practicable measure; whereas, on the contrary, if the oeciput is directed to the mother's right, we should preferably resort to the pelvic version. Indeed, this last operation, by converting a second vertex position into the first of the feet, would have the advantage of bringing the great occipital extremity of the head to the largest moiety of the pelvis, and would thus place the foetus in a much more favorable position. The accouchement has frequently been rendered comparatively easy by the pelvic version when resorted to under such conditions: and M. Velpeau relates a case which he happily terminated by this manœuvre, though other practitioners had deemed craniotomy to be indispensable in a former labour of the same woman.

The recommendations just made have the double object of sparing the mother from useless suffering, and more particularly of relieving the foetus from the danger it would incur from a prolonged parturition. Whence, it is evident, that the accoucheur's course will be somewhat different in those cases where there is a certainty that the child is not living; for, having nothing to fear on its account, he might accord a much longer time to the uterine contractions, especially as the head, which is then softened and reducible, contributes far more to an easy expulsion than under other circumstances. Consequently, he ought not to interfere in such cases, until he has ascertained positively, by a proper delay, the absolute inefficiency of the natural forces.

The child's death may also modify the precept above given, in the trunk presentations, since the cephalic version was only recommended because it is more advantageous for the infant; and, therefore, after its death, the pelvic version would be preferred as being less painful to the mother.

§ 2. WHAT IS TO BE DONE WHEN THE DEGREE OF RETRACTION IS SUCH THAT THE PELVIS MEASURES THREE AND THREE QUARTER INCHES AT THE MOST, AND TWO AND A HALF INCHES AT THE LEAST, IN ITS SMALLEST DIAMETER?

If the foetus dies before or during parturition, and the uterine contractions are ineffectually prolonged, we should, doubtless, prevent the dangers the mother might undergo from the delay in the labour, by resorting to embryotomy, and the application of the ordinary forceps, or even of the embryotomy forceps.

Again, if, when the accoucheur is summoned to the patient, the membranes have already been ruptured for some time, and the waters are partially or wholly evacuated; if the uterine contractions are exerted on the child's body alone, or repeated attempts at extraction have been made without success; if, in a word, the infant's life may have been compromised, either by the length of the labour or the useless intervention of art, in all such cases it may be con-

sidered, though still living, as non-viable, and embryotomy will be the only proposable measure.

But where the degree of retraction alluded to is detected at the commencement of the travail, before the membranes are ruptured, and consequently at a time when there is no reason for supposing that the viability of the foetus has been compromised, what ought to be done?

Following the example of M. P. Dubois, we shall here admit a further subdivision into two classes, namely; one, where the pelvis has an extent of three and three quarter inches at the most, and three inches at the least; and the other, where it has but three inches at the most, and two and a half inches at the least, in its smallest diameter.

In the former case, after having waited for all that can reasonably be expected from the uterine contractions, the forceps is to be applied, and if moderate tractions are found to be insufficient, the instrument should be withdrawn, so as to permit the contractions to exercise their force for an hour or two longer; and if they are still ineffectual, the forceps is to be reintroduced; when, if this second application is also without effect, the accoucheur will find himself reduced to the alternative just spoken of; and the child's life, being certainly compromised, will authorize a resort to craniotomy, rather than to any operation that would be more serious and disastrous in its consequences to the mother; I allude to symphyseotomy, and the Cæsarean operation. In the second, some accoucheurs advise the Sigaultian section (*vide Symphyseotomy*); but the English practitioners preferably mutilate the child.

When the degree of retraction is found within the indicated limits, when the woman affected therewith has passed the seventh month of her gestation, and, moreover, her infant is living, a premature artificial labour, which we shall hereafter have occasion to treat of more in detail, might be brought on. (*Vide Premature Artificial Labour.*)

The recommendation to subject pregnant women who are affected by a retraction of the pelvis to a restricted diet and to repeated blood-lettings during their gestation, equally applies to the degree of narrowing now under consideration, and more particularly so where the smallest diameter still measures at least three inches. For Merriman, Moreau, and some others, believe that, by thus depriving the mother of nutritive aliments, and by extracting a moderate quantity of blood from time to time, the nutrition of the foetus can thereby be diminished, and its perfect development be prevented. I have heard M. Moreau sustain this view, and bring forward several cases in its behalf; but most of our teachers hold a contrary opinion. Unfortunately, the facts cited both for and against this theory, are not, as yet, numerous enough to decide the question; and, in the present state of our science, I think it would be imprudent to rely on the supposed influence that an enfeebling regimen, imposed on the mother during her gestation, might have over the development of the child.

§ 3. WHAT IS TO BE DONE WHEN THE DIMENSIONS OF THE PELVIS ARE UNDER TWO AND A HALF INCHES?

If the child is living, we have, evidently, only to choose between the Cæsarean operation and the mutilation of the foetus, for its spontaneous or artificial expulsion is here physically impossible. (*Vide Cæsarean Operation.*) But if it is dead, or if, in consequence of the duration of the labour, and the repeated attempts at extraction which have been made, there is reason to believe that its viability is so compromised that it might be considered as incapable of surviving after its birth, the indications will vary according to the degree of retraction.

Where, under these latter circumstances, the pelvis offers two inches at least in its smallest diameter, and it is yet possible to hope, that, by reducing the size of the parts by craniotomy, the accouchement can be terminated without subjecting the mother to any very serious dangers, the mutilation of the foetus should be resolved on, and its extraction effected by aid of the embryotomy forceps. But when the pelvis is reduced below two inches we can no longer think of extracting the child by the natural passages; and the Cæsarean operation is then alone admissible. Because the extraction of the base of the cranium, after the perforation of its vault, and the evacuation of its cavity, requires such numberless gropings and violent efforts, such repeated and grievous pressures and distensions, that the chances for the mother's safety after these painful attempts, which are sometimes made without any benefit, are not more favorable than those which follow the Cæsarean operation.

In our remarks, thus far, we have supposed that the child always presented by its cephalic extremity; but, in order to fill up the outline we have traced, it is now necessary to point out what must be done when the pelvic extremity presents, the basin being two and a half inches at the most. If, under such circumstances, the head still remains there after the escape of the trunk, or from being entirely separated from the latter by decapitation, it may become arrested above the superior strait; when, if the least diameter of the pelvis amounts to two inches, craniotomy, and the application of the embryotomy forceps, will evidently be indicated. But if the retraction be more marked, it would be necessary, after having diminished the volume of the parts, and attempted in vain every effort at extraction compatible with the mother's safety, it would be necessary, I repeat, to separate the head from the trunk, by dividing the neck, and to abandon its expulsion entirely to nature; for, notwithstanding all the dangers to which the woman would then be exposed, this would be better than the Cæsarean operation, performed after the almost total retraction of the womb.

If nothing has hitherto been said concerning the vices of direction in the axis of the pelvis, it was only because, like Professor Nægèle, we do not attach to this particular variety of defective conformation all the importance that Lobstein and many other accoucheurs have attributed to it. True, the degree of inclination of the superior and

the inferior straits may depart widely from the figure before given as expressing the average normal condition. Thus, the plane of the abdominal strait may be so inclined downwards that it is sometimes quite vertical, as in a woman described by M. Nægèle; while, at others, there is no inclination at all, being then almost horizontal; and, again, the upper part of the symphysis pubis may be more elevated than the sacro-vertebral angle, the plane being inclined from above downwards, and from before backwards, as in the case reported by M. Bello. (*Transactions Médicales*, t. xiii. p. 285.) The plane of the inferior strait may present the same irregularities in its inclination; indeed, the direction of the two straits is most frequently changed at the same time.

But excepting some inconveniences which the woman suffers during gestation, that are more particularly dependent on the vicious direction of the uterus, whose displacement is often a consequence of the vice of direction in the axis of the superior strait, the puerperal functions are scarcely troubled by the anomaly mentioned; for, although this abnormal direction of the pelvis has appeared in some few cases to afford a serious obstacle to the delivery, it was only because it happened to coincide with a deformity in the bones, and a retraction of the cavity. The facts reported by Moreau and Bello, when carefully examined, clearly confirm the second part of this proposition, while the first is fully borne out by the curious observations of M. Nægèle.

CHAPTER II.

OF THE VICES OF CONFORMATION IN THE VULVA AND VAGINA.

THE vices of conformation in the genital parts may either be congenital or accidental; but, as both offer very similar indications for treatment, I shall include them in the same description. In treating of these, we shall successively take up the congenital or accidental fusion of the labia externa and interna; the persistence of the hymen; the contraction and rigidity of the vulva; the partitions, bands, and cicatrices that may exist in the vagina; and the narrowness of this canal.

§ 1. FUSION OF THE GREATER AND THE LESSER LABIA.

This may exist at birth, or it may result from some wound or ulceration, the healing up of which has not been properly attended to. Denman has remarked that this abnormal union is very frequent in little girls, though it is rarely observed at the age of puberty, as the free and constant use made of their limbs, when they begin to walk, most probably causes a spontaneous separation. This union may be more or less complete, intimate, or resistant. When

resulting from an accident, it is never perfect, because the continual passage of the urine prevents an adhesion from taking place at the point corresponding to the meatus urinarius: and the discharge of the menstrual fluid, when the courses come on before the cicatrization is completed, likewise opposes the adhesion of the labia for a very considerable extent.

§ 2. PERSISTENCE OF THE HYMEN.

The hymen may occasionally persist even after copulation, and thus constitute an obstacle to the child's free expulsion; and the divers varieties of form it may exhibit under such circumstances were pointed out in the anatomical description of this membrane. A persistence of the hymen is not always an obstacle to conception, since most of the authors relate instances in which they were obliged to divide it at the time of labour in order to make a suitable passage for the infant. They have even detailed examples of pregnant women, in whom a second hymen was found some distance above the first. Again, this membrane has persisted after the delivery, as proved in a case observed by Meckel, Sr., and reported by Tolberg; in which a woman, after having expelled a foetus of five months, surrounded by all its membranes, still preserved her hymen intact, circular, and tense.

§ 3. CONTRACTION AND RIGIDITY OF THE VULVA.

The rigidity of the external parts of generation, which is frequently observed in women who do not become *enceinte* until an advanced period of life, as also in very young, muscular girls, who are somewhat fat and of a plethoric habit, often causes a considerable delay in the progress of the head during the first labour. Most commonly, however, this narrowness and natural rigidity give way, and the parts become distended: but this distension is not always so complete as the volume of the head demands; and then the latter, being urged on by the violence of the uterine contractions, breaks down the resistance before it, and a laceration of the posterior vulvar commissure and of a more or less considerable portion of the perineum results in consequence. In certain cases, as elsewhere described, the contraction is vainly exerted for a long time against the resistance of the soft parts, and it becomes enfeebled or ceases altogether; and the intervention of artificial measures is then indicated, at first to restore the contraction if possible, and afterwards to replace it by moderate tractions with the forceps.

In cases of this nature, where the travail had been abandoned for too long a time to the resources of the organism, the fourchette, being too firm to yield, has been known to remain intact; while the perineum, from having been distended beyond measure, and thereby rendered thinner, was perforated at its centre, in such a way that the child was expelled through an accidental opening, which was bounded in front by the posterior commissure of the vulva, and behind by the sphincter ani muscle. At the present day, this fact is well determined. But it may happen that the perineum is per-

forated at its middle, and yet, notwithstanding this accident, the foetus passes out through the natural passage: this is particularly apt to occur when the accoucheur's hand, by being forcibly applied on these parts, endeavors to press back the head in its normal direction, and thus replace the accustomed resistance of the pelvic floor. Therefore, it does not follow that the infant has escaped through the central laceration of the perineum, simply because such an opening is met with after the delivery.

The contraction and rigidity of the external parts may likewise be owing either to abnormal bands, or to resistant and inextensible cicatrices, which have resulted in consequence of the wounds or lacerations that often occur in the course of slow or difficult labours.*

It must not be supposed that all women, in whom the fourchette

* To the numerous examples recorded in the books, I may add the following from my own experience: In the beginning of January, 1838, while I performed the duties of Chef de Clinique at the hospital of the Faculté, a woman of about thirty years of age was brought there, who was pregnant for the second time, and had reached her full term. She had been in labour since the previous Friday evening, and it was then Sunday morning. The patient informed us that the membranes were ruptured on Saturday at eight, A. M., and that the head appeared to descend rapidly in the excavation, but was arrested in the passage. The accoucheur in attendance called one of his brethren in consultation, and they attempted an application of the forceps at two o'clock in the afternoon, without any benefit. At eight in the evening, everything being in the same condition, they renewed the use of the instrument, which still proved ineffectual. They then waited until Sunday morning, and had the patient transported to the hospital. As Professor P. Dubois was absent on her arrival, I examined the woman, and found that the head had entered the excavation and was resting on the floor of the pelvis, the inferior strait of which appeared to be slightly retracted. A transverse band, about the thickness of a large goose-quill, and composed of a very hard and apparently cartilaginous tissue, existed at the posterior commissure of the vulva. (The woman then told us that her former accouchement could not be terminated without resorting to the forceps, and that a considerable laceration of the perineum had resulted in consequence of its use.) At every pain, which, however, was feeble and infrequent, the child's head pressed strongly against this bridle, but the latter did not yield in the least; and for two hours, during which we watched the progress of the labour before taking any part, the head did not advance a single line; besides, the vulva did not dilate, and the band remained as hard, resistant, and inelastic as ever. I was about to make an incision on the anterior commissure of the perineum; but, a new examination of the parts having satisfied me that the lower strait was somewhat retracted, that the pains were very feeble, and consequently that the head's arrest might be dependent on these two circumstances, as well as upon the resistance of the band, I resolved to attempt a new application of the forceps. The head was then in an occipito-pubic position, or nearly so, though the occiput was still a little to the left; the blades were applied and locked without difficulty, but the first tractive efforts proved to be wholly abortive; after trying for a quarter of an hour, I succeeded in fairly engaging the head in the osseous strait; the posterior part of the perineum began to bulge out, though the commissure still resisted, and the pressure thus made on the soft parts seemed to arouse the uterine contractions, for the woman, from that moment, aided my efforts with all her powers. Under the conjoint influence of these two forces, the head constrained the vulva to dilate, the band gradually yielded, it became thinner and more distended, and finally, after three quarters of an hour of constant tractions and almost continual pains, the head succeeded in clearing the vulva. The perineum was well sustained by an assistant, and did not exhibit the smallest trace of a laceration.

had been destroyed in a former labour, and in whom the band resulting from the vicious cicatrix had constituted the obstacle to delivery, are as fortunate as those whose history I have just given; for sometimes a fresh laceration has occurred, and at others the resisting band has not yielded, and the infant has been expelled through a central rupture of the perineum.

§ 4. RESISTANCE OF THE PERINEUM.

It is not at all unusual, particularly in strong and muscular primiparae, and in those possessing a considerable embonpoint, to find the labour progressing very regularly at first, the head clearing the cervix and descending into the excavation as far as the pelvic floor, and then its further progress will be at once entirely arrested: the uterus struggles energetically for a time against this obstacle, but, notwithstanding the force of its efforts, the head may remain there for several hours without advancing a single line. This resistance on the part of the perineum is evidently owing either to an excessive contraction of the muscular fibres that enter into its composition, or else to the presence of so great a quantity of adipose tissue, as to render this portion of the pelvic wall too inextensible to permit the escape of the head.

But whatever may be the cause of the resistance, it affects the ulterior course of the travail in two widely different ways, which it is highly important to distinguish in practice, for they require the employment of opposite means. For instance, it may happen that the uterine contraction, which was originally strong and energetic, is sustained in the same degree during several hours, but then, being overcome by the resistance which it cannot surmount, it grows weaker, is exhausted, and finally disappears altogether. The indications here are obvious: to endeavor to arouse the pains again, by making the patient walk about her chamber, by rubbing her abdomen or titillating the cervix uteri, and by administering the ergot; and, if all these prove ineffectual, to apply the forceps. But a very different case is occasionally met with, in which the contractions, so far from being exhausted, are kept up as strong and vigorous as at the commencement of the labour; and yet, notwithstanding their energy, they are incapable of effecting the dilatation of the soft parts in the perineum; for this is an insurmountable resistance against which the most powerful efforts are spent in vain. In this latter case, the accoucheur should evidently avoid the use of those means calculated to arouse the contractions—the ergot in particular would be exceedingly dangerous—since those tetanic and irregular contractions that follow its use, and which have so often been followed by the death of the child, and even by a rupture of the womb that has almost uniformly proved fatal to the mother, are then peculiarly apt to occur. The uterus is certainly doing all that it can, and the physician should not attempt to arouse any more energetic contractions, but should rather aid its expulsive efforts by tractions carefully performed on the child; and an application of the forceps is clearly the only resource. Our view of its particular mode of action

in the case before us will be studied hereafter, in the article on Forceps.

Now, in order to illustrate this distinction, which we believe very important in practice, we will suppose two women in labour, in both of whom the child's head is properly situated, and has rested on the pelvic floor for six or seven hours; but, in one of them, the contractions, that were at first strong and frequent, have gradually become more feeble and rare, or even have almost entirely disappeared; while in the other, on the contrary, they still maintain all their original power. In the latter case, we would apply the forceps immediately; whilst, in the former, we should first have recourse to the various measures calculated to restore the pains, and we would only resort to the forceps when these excitations had proved ineffectual, or the pains caused by the ergot still appeared to be insufficient. This inefficiency of the pains brought on by the ergot is not very unusual in the case before us; but even then, the administration of this article will have been useful, though an application of the forceps be afterwards deemed necessary; because the instrument will then be applied under much more favorable conditions; for the contractions produced by the secale cornutum will aid the artificial tractions; and, moreover, will prevent the consecutive inertia of the womb, to which the woman would have been exposed, if the instrument had been applied without previously exciting its contractility of tissue.

§ 5. VICES OF CONFORMATION IN THE VAGINA.

This canal may be wanting altogether; but, as it then generally coincides with an absence of the womb, the care of the accoucheur in such a case is evidently unnecessary.

Again, it may be obliterated wholly or in part in one portion of its extent, either by the partial or the complete agglutination of its walls, or by actual partitions, passing from one side to the other. This cohesion may be congenital, and the vagina exist as a dense, solid cord, not traversed by a canal, but, on the contrary, reduced to a simple, cellular tract; or it may be accidental, resulting most usually from lacerations or lesions during former labours, or else from wounds or injuries. Thus, in a woman, reported by M. Lombart, of Geneva, who used a pint of sulphuric acid as an injection, with the culpable design of procuring an abortion, the bladder was found to be fused immediately into the rectum, the vagina having been destroyed at the corresponding part; and M. Cruveilhier has known the vulvo-uterine canal to terminate in a cul-de-sac, about an inch from the meatus urinarius, in consequence of vaginal injections made with a solution of corrosive sublimate.

The partitions spoken of as existing in the vagina may be transverse or longitudinal; and most of the cases of double or triple hymen found in the authors can probably be referred to the former. These may be complete, that is, they divide this canal into two distinct cavities, though more frequently they exhibit a small opening

through which the liquids ooze;* or incomplete, only obliterating it in part; consequently, their form is very variable in different cases.

Where the septa are longitudinal, at times they only divide the vagina in a part of its extent; but, at others, they separate it throughout. In the latter case, the continuity of the partition may be interrupted at some part, and then the two canals that are created by its presence will communicate through this opening. The septum, when complete, is occasionally prolonged into the uterus, and likewise divides it into two cavities, although this does not always happen.

The vagina may have been originally very small, or it may have undergone a remarkable diminution or retraction, which has been carried so far as scarcely to permit the introduction of the female catheter. M. Moreau observed a young woman in the fourth or fifth month of her pregnancy, in whom this canal was so contracted that it barely admitted the barrel of an ordinary writing quill. Such a disposition, which gives rise to much uneasiness, nearly always yields to the natural progress of the gestation.†

Again, the vulvo-uterine canal may be deviated from its usual course, and present no natural openings at the parts of generation. The points where it then terminates are very various: thus, it has been known to open below the navel by two small orifices, that were separated from each other by a strong membrane, one of

* In the course of the year 1837, a young woman, who was advanced to the last month of gestation, presented herself at the clinic of the Faculté. When the vaginal touch was resorted to, the finger was arrested, at the depth of one inch and a half or two inches, by a perfectly smooth septum, in which it could detect no sensible opening. By a resort to the speculum, it became evident that the obstacle to the entrance of the finger consisted of a membrane, which adhered to the walls of the vagina, and completely blocked up its cavity at this point. Its surface appeared to be nearly an inch in diameter; and, by pushing and distending it with the extremity of the instrument, a small opening was detected towards the upper third and right portion of this partition, through which a few drops of a sero-purulent liquid were oozing.

The extremity of a blunt probe could scarcely be made to penetrate the little orifice which was directed obliquely from below upwards, and from before backwards; the instrument then entered a kind of posterior chamber, formed by the upper wall of the vagina. Thus far, no accident had impeded the course of the gestation, but some difficulty was thenceforth anticipated at the time of labour. This patient was taken during the night with pains, but they were so feeble that a commencement of the travail was not suspected; though about five o'clock in the morning two very strong and continuous ones came on, which effected the expulsion of the foetus. The lying-in was very favorable, and two weeks afterwards I found that the septum had been split into three distinct pieces; one inferior and two superior. I have examined this woman several times since, and am satisfied that the flaps still remain isolated.

† Plenck states that, being summoned to a woman in labour, he found the vagina so diminished that the little finger could not be introduced at all. Nevertheless, this canal was sufficiently dilated by the end of eighteen hours, and the child's expulsion took place without producing any laceration of it or of the external genital parts. (*Elementa artis Obstetriciae*, p. 113.)

Merriman states that the travail terminated spontaneously in thirty-six hours, in a case where the introduction of the finger was barely possible; but the patient died on the third day, and a small laceration of the vagina was found at the *post-mortem* examination. (*Synopsis*, p. 59.)

which gave passage to the urine, and the other to the menstrual fluids ; frequently, it discharges into the rectum. Portal states that a young girl, in whose vulva there was only a small opening for the passage of the urine, and whose menses were always discharged by the anus, became pregnant ; but the small opening enlarged sufficiently during the latter stages of gestation, and more particularly during the travail, to permit a spontaneous termination of the accouchement. M. Rossi reports that, having been called to a woman in labour, he discovered the total absence of the external genital organs. At first, he supposed there was a retention of the menses, and, under this impression, made an incision about two inches long in the direction of the vagina ; when, instead of the menstrual blood, he encountered a male child, escaping through this opening, that lived but seven hours after its birth. Whilst searching where the fecundation could have taken place, he discovered, after having interrogated the husband, a small orifice, near the sphincter ani and at the internal part, which would scarcely admit a fine probe.

The various obstacles just studied are most frequently surmounted by the efforts of nature alone ; and, therefore, as a general rule, there is no necessity for an early resort to cutting instruments. If however, it be deemed advisable to have recourse to an operation before the labour, for separating the agglutinated parts, incising the hymen, or for destroying an abnormal septum or vaginal adhesion, it would be better to wait until the first four or five months of the gestation had passed over ; because, after this period, there would be less reason to fear the unfavorable influence which the shock caused by the operation might have over its progress. As the hymen and the vaginal septum are nearly always perforated by an opening, a director might be introduced into it, along which a bistoury should be passed, so as to incise the parts ; where it is necessary to divide the adherent labia, we might use the scissors, as their agglutination is always incomplete ; but, in all cases, the incision must be carried as low down as possible, so as to open a free passage for the lochia. When it is desirable to destroy the hymen or a septum, it is usually recommended to make a crucial incision, and even to excise the flaps to prevent them from afterwards reuniting. A similar plan would be resorted to, at the time of parturition, excepting that the same importance does not attach to the excision of the flaps, as the discharges of the lochia would prevent their reunion.

As to the bands and partial retractions found at some part or other of the canal, we should delay our operation, for they most generally become softened, more supple, and ultimately permit the delivery to take place ; in the contrary case, they must evidently be incised.

Finally, an accidental and complete obliteration of the vulva, occurring during the course of gestation, would require the creation of a new passage for the head, as soon as the latter distends the perineum ; and it is advisable to make the incision in the place usually occupied by the vulvar orifice.

§ 6. INVERSION OF THE VAGINA.

An inversion of the vagina occasionally takes place during parturition; that is, the mucous membrane of this canal being pressed down by the child's head, and consequently being more or less inverted, forms a livid and fungous cushion of a considerable size between the labia, or beyond the vulva, which opposes its descent. The pressure made by this part on the inverted membrane, often gives rise to gangrene; and, therefore, with a view of preventing this unfortunate result, the forceps ought to be applied at once. The causes that predispose the patient to an inversion of the vagina, are, a long and difficult labour, a large head, and a marked relaxation of the mucous membrane. If this affection is detected before the head is engaged, the accident might be prevented by pushing up the membrane at the commencement of the travail, and maintaining it there until its close.

CHAPTER III.

OF THE TUMORS IN THE EXCAVATION.

THE tumefactions that may obstruct the excavation are extremely numerous and varied; and, where they have acquired a considerable volume, they constitute one of the most serious difficulties in the practice of midwifery. It will not be in our power, in this work, to enter into all the details which the importance of the subject demands; besides, all that relates to the etiology, the pathological anatomy, and the symptomatology of these tumors, rather belongs to surgery than to the obstetrical art; and we must confine ourselves more particularly to pointing out to the practitioner those signs by means of which their diagnosis is established, as also to bringing into view the different indications they present for treatment. It is proper to state in the outset that, in compiling this article, we have freely extracted from the learned dissertation of M. Puchelt on this subject, whose classification we retain.

The tumors, whose influence over parturition is about to claim our attention, may have their origin either in the walls of the canal, which the foetus has to traverse (and therefore appertain to the soft parts or to the osseous parietes), or they may be a dependency of the neighboring organs.

ARTICLE I.

OF THE TUMORS DEVELOPED IN THE OSSEOUS WALLS.

The ossific tumors, large enough to constitute an obstacle to natural labor, are the exostoses, osteo-sarcoma, and those that result from old and imperfectly consolidated fractures.

§ 1. EXOSTOSIS.

If we lay aside, says M. Danyau, all those cases where an unusual prominence of the sacro-vertebral angle has been mistaken for a true ossific tumor, as well as those where there is an uncertainty with regard to their character, from the insufficiency of the details in the written account, there positively remain but two examples of exostosis, the authenticity of which is incontestable; namely, those reported by Leydig and Mackibbin. Though some doubts may still exist, as to the value of many assertions that have not been subsequently confirmed by the autopsy, yet, I do not believe that we can thus strike out, by a dash of the pen, most of the observations recorded in our science. For example, it would really be difficult not to admit the authenticity of the one reported by Gardien, since Duret preserved the pelvis of the female who was the subject of it for a long time in his cabinet.

The facts reported by M. Puchelt, prove that most pelvic exostoses arise from the anterior face of the sacrum. Nevertheless, several other points of the basin have likewise been their seat; thus they have been known to spring from the sacro-vertebral articulation, from the last lumbar vertebra, or the first bone of the sacrum, and from the posterior face of the pubis, either from its middle part, or on one of the sides, as also from the internal face of one of the ischia.

What has been stated respecting the uncertainty of the published observations, forewarns us of the difficulty that is at times experienced in diagnostinating the pelvic exostoses, and in distinguishing them from the various prominences caused by the deformities of the basin. The hardness of the tumor, and its original adhesion to the osseous parietes, are given as characteristic signs; its unevenness and immobility are also important to be ascertained. Being always covered by the vaginal wall, it projects into the interior of this canal, by pressing aside the organs situated before it. When arising from the sacrum's anterior face, it impinges on the posterior wall particularly; and, if the rectum be then explored, the latter will be found slightly pressed forward by the tumor, which is itself located behind. This last sign is very important, for nearly all the other tumors are situated in front of the gut.

The prognosis is necessarily dependent on the size and situation of the tumor, and on the earlier or later period of gestation, at which the labour takes place. It is evidently more serious when the

abnormal growth is very voluminous; when it is so placed as to diminish one of the small diameters of the straits, and when the child's head is very large.

The indications for treatment, which were so fully described in studying the vicissitudes of pelvic conformation, present themselves anew, and demand the employment of the same means; namely, to abandon the travail to nature when the tumor is small, and is situated in such a manner as only to diminish the large diameters; or to apply the forceps, resort to symphyseotomy, to the Cæsarean operation, or to embryotomy, according to the degree of retraction. (*Vide* page 476.)

§ 2. OF OSSEO-SARCOMA.

Osteo-sarcoma of the pelvis is a very rare disease; two instances, however, are recorded, in which the retraction produced by it was extensive enough to require the Cæsarean operation.

The tumor can scarcely be distinguished from that of exostosis, unless, perhaps, it is by the inequalities it presents, and more particularly by the depressibility, the semi-eartilaginous softness, and the crepitus that it may offer at certain portions of its surface.

It is evident that this depressibility of the tumor will render the prognosis less serious than in cases of exostosis; since we may indulge a hope that the head being urged on by the uterine contractions, will flatten it down, and make it disappear in part. Consequently, it is here permissible to wait a longer time; but as soon as the inefficiency of the efforts of nature becomes apparent, we must resort at once to the same measures as in cases of pelvic retraction.

§ 3. OSSEOUS TUMORS RESULTING FROM DEFORMITIES.

The ossific protuberances in the pelvis may likewise depend on the irregular consolidation of an old fracture in this part; or may be formed by the head of the femur, which, in consequence of coxalgia, has traversed the bottom of the carious and perforated acetabulum, and projects into the pelvic cavity. I recollect having read in a medical journal (which I cannot now find) an account of the Cæsarean operation having been performed in a case where the sole obstacle to delivery was thus formed by the head of the thigh bone.

A representation of a fracture is given in the atlas of Professor Moreau, taken from the *Musée Dupuytren*, in which the bottom of the right cotyloid cavity has been driven in, the internal wall forming a rounded tumor that projects nearly an inch and a half inwards; the ilium was at the same time divided beyond the right sacro-iliac symphysis; but, in consolidating, the exterior part of the iliac fossa has been carried inwards in such a manner as to approach towards the sacrum, whereby the tumor formed from the cotyloid wall is brought near to the sacro-vertebral angle.

The *Journal des Progrès*, t. xv., 1828, contains another curious instance of a fracture of the pelvis, with a consecutive deformity in the excavation followed by mortal symptoms; this woman had previously had five fortunate deliveries. The Cæsarean operation has

frequently been performed for obstacles of this nature; thus Burns, Lever, and Barlow have each reported a case of the kind.

In conclusion, it is evident that, from whatever point the osseous tumors of the pelvis may arise, this cause of dystocia will still present the same indications for treatment.

ARTICLE II.

TUMORS APPERTAINING TO THE SOFT PARTS.

The tumors appertaining to the soft parts may either be attached to the vulva or vagina, or they may arise from the neck and body of the uterus. Those which are seated in the vulva or the vagina are very variable in their character; thus we may enumerate an œdema of the labia-externa, a thrombus of these parts, cysts, abscesses, fibrous tumors with or without pedicles, together with cancerous degenerations and vegetations of every kind; while those appertaining to the neck and body of the womb depend on an induration of the os tincæ, an elongation and tumefaction of the anterior lip, abscesses, cancers, or other degenerations with which they may be affected; or, lastly, on polypous masses that arise from the cervix or body of the womb, and project into the excavation.

§ 1. œDEMA OF THE LABIA EXTERNA.

The œdema of the greater labia, already alluded to, when treating of the complications of pregnancy, is sometimes so considerable at the time of labour as to obliterate the entrance of the vagina almost completely; and, by opposing the necessary distension of the vulva, it may render the parturition very difficult, as well as exceedingly painful. The child's head may produce a gangrene in the parts thus tumefied by the pressure on them during its passage, or, at least, an extensive rupture. These accidents are to be prevented by making punctures with the lancet in all the swollen tissues; the number of the punctures will necessarily vary with the extent of those parts, and the degree of their engorgement.

§ 2. SANGUINEOUS TUMORS, OR THROMBUS.

The tissue, that constitutes the lips of the vulva, and doubles the entrance of the vagina, is composed of venules, arterioles, cellular filaments, and fatty masses, so interlaced and held together, that the blood effused there (which it often is profusely), cannot infiltrate any further; besides which, the stagnation of the fluids in the external genital parts, and the varicose state of the vaginal veins, so frequent in pregnant women, predispose all these organs to what is denominated thrombus. In fact, during gestation, and more particularly in the course of its latter months, these large veins are apt to give way, either spontaneously, or else, in consequence of some external violence, and the blood is extravasated into the cellular tissue, whereby a considerable tumor is developed; and, in the course of a varia-

ble period, gangrene attacks the distended parts, and a hemorrhage, which is occasionally very profuse and sometimes even fatal, takes place.

Thrombus of the vulva does not appertain to pregnant women exclusively, since it may also be manifested in the non-gravid condition; indeed, according to Velpeau, it is even more frequent than in gestation. However, it must be acknowledged that the obstruction to the circulation in the lower extremities, caused by the development of the womb, must necessarily favor the production of this tumor; and, consequently, that, in the non-pregnant state, a thrombus of the vulva is far less dangerous than in the opposite condition.

This tumefaction most generally affects the greater labia, though it has also been observed in the lesser; in most cases, a single lip only is involved, though at times there is a double tumor, caused by a simultaneous effusion into both of the labia externa. Wherefore Boër was wrong in supposing that the right one was its exclusive seat, for it may appear indifferently on either side.

It is rarely present in the earlier months of gestation, but it is more frequent in the latter periods, and particularly so during the travail, or after the delivery. The most common causes of thrombus, pending the pregnancy, are blows, falls, violent commotions, etc. etc. In some cases, it can be traced to no external violence, and then the spontaneous rupture must evidently be referred to an excessive distension of one of the vaginal veins. When occurring during labour, this affection is nearly always manifested just as the head or breech endeavors to clear the vulva, after having reached the inferior strait. The rupture of the veins is then certainly caused by the distension, which they, like all the other parts, are subjected to (a distension to which they yield with more difficulty), and by the great accumulation of blood produced by the impediment to the circulation from the presence of the child's head. Therefore, an excessive size of the latter, or its unusual delay at the inferior strait, a narrowing of the pelvis, and the consequent immoderate efforts on the part of the patient to overcome the resistance, are its most common causes. Certain authors have likewise supposed that the obliquities of the womb, and the frequent, rough examinations of the parts of generation, might produce them; but it is evident that such circumstances cannot have the attributed effect, unless a varicose predisposition exists at the same time. Ordinarily, these tumors only appear after the delivery, when, indeed, they are the more dangerous; first, because they may the more readily escape unperceived, and then, because the relaxation in the parts permits them to acquire a very considerable volume.

The development of a sanguineous tumor is generally announced by a severe pain in the affected part, caused, doubtless, by the rupture of some of its vessels; then one, or sometimes both of the greater labia, or, perhaps, only the nymphæ, soon swells up and becomes rapidly distended, and forms a more or less voluminous tumor. This tumefaction may acquire a considerable size, and the quantity of effused blood be great enough to debilitate the patient,

and, possibly, to produce syncope. In some instances it acquires its full volume at once, while in others it goes on augmenting for twenty-four hours; it may be limited to the external parts, or it may extend deeply into the pelvis, and, possibly, as far as the iliac fossæ. Again, it not unfrequently happens that the effusion commences within the basin, and subsequently approaches the exterior. The tumor shortly assumes a violet or livid hue; and when the thrombus is seated high up, this discoloration of the skin rarely permits it to be mistaken; when lower, and in the substance of the greater labia, on the contrary, it may neither be accompanied by ecchymosis, pulsation, nor throbbing. Where the blood infiltrates into the meshes of the cellular tissue only, the tumor is hard; but it becomes soft and fluctuating when this texture is torn, and there is an abnormal cavity formed. Again, it is not unusual for the skin, or mucous membrane covering it, to give way in consequence of being gradually rendered thinner; thereby giving vent to a considerable discharge of blood, with an instantaneous cessation of the pain; and this hemorrhage may be so profuse as to speedily terminate in death.

A copious bleeding has occasionally taken place during the formation of a thrombus. In fact, this circumstance may occur whenever the mucous membrane and one or more of the veins are lacerated at the same time, unless the two openings do not correspond with each other; for then one part of the blood will escape into the vagina, while the other is infiltrated into the cellular tissue.

Where the thrombus has acquired a considerable size, it may evidently impede the passage of the head, and after the accouchement, that of the placenta and lochia. Besides which, the pressure on the cervix vesicæ and rectum, thereby caused, may occasion a retention of the urine and fecal matters.

Madame Lachapelle relates a very curious instance, in which a thrombus, that had first commenced during the labour, underwent a rapid development after the child's expulsion. The tumor obstructed the vagina so much, that it prevented the escape of the lochia, whence the latter accumulated in the womb, and became, somewhat later, the source of a profuse hemorrhage. Fortunately, she continues, in the attempts to introduce my hand into the uterus, for the purpose of extracting the clotted blood, I ruptured the tumor involuntarily, near the entrance of the vagina, when a large quantity of coagulated blood immediately escaped, its size diminished, and all the attendant symptoms disappeared without any particular treatment.

The diagnosis of these tumors is, in general, quite easy; for their prompt appearance, their rapid development, their hardness when the blood is simply infiltrated, and fluctuation when it is collected in an abscess; the violent pains they give rise to, and the bluish discolouration of the skin, are always sufficient to detect them. Nevertheless, they have sometimes been confounded with certain other tumefactions, such as the simple varicose ones, an inversion of the vagina, the descent or inversion of the womb, and with the vaginal herniæ formed either by the intestine, the omentum, or the bladder;

but as we shall have occasion hereafter to treat of each of these tumors, and their peculiar signs, it seems useless to enter here into their different diagnoses.

The prognosis is usually unfavorable; thus, "in sixty-two cases brought to my knowledge," says M. Deneux, "the mother died in twenty-two of them, either during the gestation, or else during or after the accouchement; and, with the exception of a single instance, all the children of these twenty-two females were likewise lost. The profuse hemorrhage is the most frequent cause of the patient's death, though the latter may also be occasioned by the gangrene and suppuration which often follows the primary symptoms."

These tumors may terminate either by resolution, by suppuration, rupture, or by gangrene, but as the progress of the disease exhibits nothing peculiar in any of those cases, we shall merely mention them in passing.

The treatment of thrombus necessarily varies according to its size, and the sufferings thereby occasioned to the female, as also to the period at which it is manifested. If the patient be in labour when the tumor is developed, and the latter be large enough to seriously impede the passage of the head, the effused liquid should evidently be evacuated by a free incision, made on the most dependent part of the swelling, the extent of which must be proportioned to its volume. If this operation is performed some time before the head engages in the excavation, it would be advisable, after having emptied the sac, to make use of the tampon in order to prevent unnecessary hemorrhage; but if, on the contrary, the tumor is only opened when the head is fully engaged, the application of the tampon may be dispensed with, for the child's head will sufficiently compress the divided vessels to prevent a further discharge of blood. In the latter case, it would be requisite to attend to the precautions described below, after the delivery.

We should attempt its resolution, whenever it appears in the course of gestation, or after the expulsion of the foetus and appendages, when the fluctuation is obscure, the effusion inconsiderable, the skin and mucous membrane but little affected, and when the progress of the thrombus appears to be arrested.

The measures calculated to favor this resolution, are the same here as in any other effusion of blood; venesection, in particular, is one of the most efficacious remedies in these cases.

But, unfortunately, the circumstances favorable to a resolution of the tumefaction do not always exist; for the blood, after having broken down a great number of cells, is often collected in a considerable quantity at one point, and the skin and the mucous membrane of the vagina are rendered so thin, that the color of the effused liquid can readily be seen through them; and their mortification would then seem to be inevitable. Under such circumstances, a resolution would be attempted in vain; for very soon, the over-distended parts will give way in the midst of frightful sufferings, or a gangrene will attack the thinnest points and commit fearful ravages; all of which might have been prevented by a proper incision timely

made. But the question arises, when should this operation be performed? Some persons recommend it to be made as soon as possible, while others condemn an early opening. The latter fear lest an uncontrollable hemorrhage might occur; while the former dread the accidents described above. Between these two extremes, I believe the following will be found the wisest course to pursue in most cases; where the size of the tumor augments without ceasing, the patient becoming enfeebled, and when there is every reason to believe she may die of internal bleeding, to make an incision into the affected part at once, and then resort to the tampon; but, on the other hand, where the tumefaction does not increase, we might delay our action for several days, for a certain part of the extravasated blood will coagulate, and thereby put an end to the symptoms. Nevertheless, the tumor must be carefully watched, and opened as soon as the first inflammatory phenomena begin to manifest themselves.

After the incision, we are to carefully proceed to the evacuation of the clots. For this purpose, the fingers will suffice in most instances, rather than the injections proposed by certain authors, which appear to me improper as they may determine a return of the hemorrhage. But it is not necessary to remove all the clots at every hazard; for after having taken away the larger part, we might leave those which have contracted firmer adhesions to the graduated action of compresses.

§ 3. DIVERS OTHER TUMORS.

The other tumors met with on the external parts of generation, are the scirrhouς and phlegmonous ones, the cysts in the thickness of the labia externa, together with the various excrescences and syphilitic vegetations. But whatever may be the nature of these tumefactions, the course of the practitioner is always the same; that is, to do nothing, so long as, by their size and character, they do not oppose the dilatation of the vulva; but in the contrary case, to puncture the cysts, to open the abscesses, and to extirpate the vegetations or degenerated parts. As to the modus operandi in these cases, it is too simple to require a particular description.

Prompt action is not requisite in those instances where there is a polypus, for, unless it be very large, it will seldom offer an insurmountable obstacle to the expulsive efforts of the womb; because, when adherent to the vagina, these abnormal growths are often pressed beyond the vulva. But if their mass should be deemed too great to permit a delivery, the tumor might be removed.

In a case where M. Gensoul was obliged to apply the forceps, he seized the head and the fibrous body, whose pedicle adhered to the upper part of the vagina, at the same time, and brought them away together. The polypus weighed twenty-two ounces after it was extracted.

§ 4. TUMORS APPERTAINING TO THE NECK OR BODY OF THE UTERUS.

Besides the indurations, the œdematosus swellings, and the cancerous degenerations affecting the cervix uteri, which will be described in the following chapter, there are certain tumors, which, though filling up the excavation, really have their origin or seat in the proper tissue of the neck; and others, that arise from the body of the womb, to which they still adhere by a long pedicle, and yet are found hanging down in the lesser pelvis.

A. *Fibrous Tumors of the Cervix Uteri.*—These tumors may be developed in the neck just the same as in the tissue of the uterine walls. For instance, in a case described by Madame Lachapelle, the pelvic excavation was almost entirely occupied by a tumor that seemed enclosed in the lateral and posterior portions of the neck; it was as large, she states, as the head of a fœtus at term, and would have been the more likely to deceive an inattentive person, from the fact of its presenting a depression similar to a fontanelle. The child was very small, and had been dead for a long time; but, notwithstanding the size of the swelling, it was enabled to flatten it down and pass through the narrow passage that still remained free. Madame Boivin and M. Dugès found, when making a *post-mortem* examination of a woman who died of peritonitis, after a very painful though natural labour, a fibrous body about the size of the fist in the substance of the neck; the child had a fractured cranium, and was stillborn. In another case of the kind, Ramsbotham was obliged to resort to embryotomy; but the woman recovered.

These examples will be sufficient to show what we have to hope, or fear, in cases of this nature. That is, to delay all operations when the tumor is very small and is so situated as to correspond with one of the large diameters of the basin, or to extirpate it, if the bistoury can reach it without danger, which seldom happens; and, on the other hand, where its size no longer permits us to attempt the extraction of a living infant, to resort to embryotomy; and, if the excavation is completely obstructed, to open a passage for the child by the Cæsarean operation.

B. The polypous, or pediculated fibrous tumors that arise from the body or neck of the womb are seldom very serious; for, when their size appears to constitute an insurmountable obstacle to the delivery, an extirpation of them is nearly always feasible.

As a general rule their diagnosis is readily made out, though several singular errors on this head are reported in the authors; for example, Dr. Merriman relates a case in which an experienced physician mistook a polypus for the head of a child; and Smellie furnishes two similar instances; consequently, we must not trust to a superficial examination.

The influence of uterine polypi over the progress of labour will be modified by a number of circumstances; thus, when the tumor is small, it may be compressed against one of the walls of the excavation by the child's head, and the latter then passes beyond it; or,

where the pedicle is very long, the fibrous mass is pushed by the head entirely out of the vulva; and it therefore only retards the foetal expulsion in a slight degree; as occurred in a case reported by Dr. F. H. Ramsbotham; who says, "I was summoned to a woman in her third or fourth labour, whom I found suffering from severe

pains, and using forcible bearing-down efforts, under the belief that the child was about to pass immediately. On making the examination, I instantly detected that the pelvic cavity was occupied almost entirely by a solid, fleshy tumor, much larger than a goose's egg (vide Fig. 77), which was pressing considerably on the perineum; the os uteri, at the brim of the pelvis, was dilated to about the diameter of a crown piece; and the membranes, unruptured, were being forcibly propelled against the upper part of the tumor with the return of each uterine contraction. I was at no loss to determine that the tumor was of a polypous character, by its firm consistence, its shape, its situation *within* the vaginal cavity, and its attachment within the

This figure, taken from
Ramsbotham's work, shows
the situation of the polypus
described by him.

os uteri. The mouth of the womb dilated rapidly, the membranes burst speedily; and, in less than an hour after my arrival, the head, under the action of powerful throes, forced the principal bulk of the tumor external to the vulva (which still, nevertheless, retained its attachment to the uterus by the stem), and itself instantly followed." After having consulted with his father, whether it was advisable to remove the polypus at once, the question was determined in the negative for various reasons. (*Obstet. Med. and Surg.*, p. 237.)

In many cases, therefore, we may trust to the resources of the organism, remembering, at the same time, that too great a delay is not without danger both to the mother and child; and, where the inefficiency of the uterine contractions has been fully ascertained, a division of the pedicle appears to us to be the only resource. If the subsequent extraction of the tumor is rendered very difficult by its volume, it might be cut up into several pieces, as I have seen done on two occasions, or be firmly grasped with a small serrated forceps. I must acknowledge that I can scarcely comprehend how it was possible for certain accoucheurs to advise, and even to resort to the pelvic version, in some cases where the vagina was almost entirely blocked up by a monstrous polypus. It is unnecessary to add that, if the existence of this tumor in the canal be ascertained during the latter months of gestation, it should be excised immediately, if it be of a sufficient size to render the parturition difficult or tedious.

c. *Fungous, or Cauliflower Tumors, etc.*—These tumors, which resemble a cauliflower in their appearance, may arise from either lip of the womb; and then, by acquiring a considerable size, they mask the orifice and render it nearly inaccessible. As they often give rise to hemorrhage, and as the spongy tissue that constitutes them

Fig. 77.



has some analogy with the placental structure, they have occasionally been mistaken for a placenta prævia. Both Madame Lachapelle and Denman relate errors of this character; and I witnessed the following still more singular case. The internes of the Hospital de l'Oursine sent for M. Nelaton, who was surgeon to the establishment, to make the version in a supposed case of hand presentation. M. Nelaton desired me to accompany him; and, on our arrival, we ascertained that these young gentlemen had mistaken an enormous cauliflower excrescence, that sprung from the anterior lip of the cervix uteri, for the hand; its pedicle was at least an inch and a half long, and its base presented five or six little vegetations that had been mistaken for the fingers.

It frequently happens that these tumors are small enough to admit of the child's spontaneous delivery; indeed, such was the fact in the case just mentioned; but there are many others where the accoucheur is less fortunate. Take, for instance, the seven cases reported by Puchelt; in one of which it was necessary to make incisions upon another part of the hard and scirrhouss neck, so as to secure the introduction of the hand; in a second, to remove the tumor, that was attached to the anterior lip and occupied all the vagina, by the scissors; gastrotomy was resorted to in a third, on account of a rupture of the womb, which did not even save the infant; in another, the child's extraction was impossible, notwithstanding the perforation of the cranium, and the woman died before delivery. A single mother only survived. (*M. Danyau's Translation.*)

d. *Encysted tumors*, adhering to the cervix uteri, or to the vaginal walls, may also exist in the excavation. As a general rule, they are rounded, well-defined, movable, elastic, and yielding a little under a moderate pressure, and sometimes fluctuating; the mucous membrane covering them remains unaltered. A small puncture, in the way of exploration, will always dissipate any doubts concerning their true nature, especially if containing a liquid; and where they enclose a solid, cheesy, or fatty matter, some portions of it will adhere to the canula.

An early attempt should be made to push the tumor above the superior strait, before the head becomes engaged; and the membranes must be ruptured early, so as to determine the engagement of the foetus. In the opposite case, it will be requisite to evacuate the liquid by a simple puncture, or even to extend the incision far enough to allow the contents to be pressed out.

ARTICLE III.

OF THE TUMORS IN THE NEIGHBORING PARTS.

These are very variable, both in character and location; and they may appertain either to the ovary, the Fallopian tube, the rectum, the bladder, or to the cellular tissue of the lesser pelvis.

§ 1. TUMORS OF THE OVARY.

This organ may be affected with a number of diseases, nearly all of which have the effect of singularly augmenting its volume; thus cysts, distended with solid or liquid matters, are frequently observed there, and abscesses have also been met with; or this body itself may become hypertrophied, or be filled with scirrhouss or brain-like substance. But we shall not treat of these latter affections, further than to examine the influence they may have over the puerperal functions. In this respect, it is highly important to ascertain the exact seat of the tumor; for sometimes the diseased ovary remains in the abdominal cavity above the superior strait; and, again, it is very often displaced, and falls into the pelvic excavation. In the former case it may, doubtless, incommod the development of the uterus, by its bulk, and thus bring on a premature labour; or it may produce an obliquity of the womb by pressing the latter to the opposite side, which may prove a source of dystocia; but it particularly claims the attention of the accoucheur when situated in the lesser pelvis; for it may then so obstruct the passages, that a natural delivery of the child becomes wholly impossible.

The tumors, constituted by the displaced ovary, nearly always fall down into the cul-de-sac, formed by the peritoneum, in being reflected from the posterior surface of the uterus to the anterior one of the rectum. In a single case only, reported by Jackson, has it been found behind the rectum, which latter was then pressed forward. This singular anomaly merits attention.

The ovarian tumors vary greatly, both in their volume and form—from the size of a small orange up to that of a child's head; sometimes they only occupy one part of the excavation, while, at others, they fill it up so completely, that the finger can scarcely be introduced between them and the pelvic walls. It is important in practice to ascertain these differences of size and location, and equally so to detect the nature of the tumor, and the kind of material that forms it. In some cases of ovarian dropsy, the fluctuation is so evident that no possible doubt can exist concerning its character, but, in others, this sensation is not so clearly recognized; though here the smooth and polished surface of the tumor, and its rounded form, compared with the irregularities, and the nodules exhibited by cancerous degenerations of this organ, will facilitate the diagnosis. The density of the fluid tumor, its elastic resistance and fluctuation, are singularly modified during the contraction; because, being then strongly compressed by the child's head, the sac, that was at first soft and yielding, becomes hard, tense, and resistant; consequently, it is advisable to examine both during and after the pain, for the differences then presented will likewise aid in making out the diagnosis. The exploration should be made by the vagina and rectum simultaneously, since this is the best method of distinguishing the enlargements of the ovary, from those belonging to the uterus or the vagina. The double exploration only admits of their being confounded with the tumors existing in the recto-vaginal septum; but

this error would be of little consequence, since the two cases present the same indications for treatment.

The presence of such tumors is always an unfavorable complication of the labour; but the prognosis will necessarily vary with their volume, seat, nature, and mobility, as also according to the period at which the physician is summoned. Thus, in thirty-one cases recorded by Puchelt, fifteen were fatal to the mother and twenty-three to the child; of which one woman and twenty-one children died during the travail.

As regards the treatment, the same course is not always to be pursued in the cases under consideration; because there is evidently nothing to be done where the size and locality of the tumor afford a well-grounded hope of a spontaneous delivery; but when it is movable, and the head has not yet engaged, it is recommended to attempt to press up the former above the abdominal strait; and, should the tumor still have a tendency to fall back, after having been carried up, it ought to be supported, while the feet are sought after or an application of the forceps is resorted to.

But in some grave cases the engagement of the head or the adhesions of the tumor render a return of the latter impossible; here it is particularly important to be certain of its nature; and if the signs above indicated have not proved sufficient to settle the diagnosis, a puncture should be made in it, which would determine the question of its fluidity or solidity. If it proves to be an ovarian dropsey, it is to be evacuated by a trocar somewhat larger than the one used for the exploratory puncture; but if the cyst be multilocular, or if it contain a cheesy matter that cannot escape through the canula of the trocar, a free incision will evidently be requisite.

The incision or the puncture is usually made by the vagina, as the evacuation of its contents is more easily effected through this canal. Some persons, however, fearing lest an incision made through the vaginal wall might become enlarged at the moment of the head's passage, have recommended the introduction of the instrument through the rectum; and although this mode of operating ought, in general, to be rejected, it should certainly be followed in those cases where the tumor is located between the posterior part of the rectum and the anterior surface of the sacrum.

Again, the tumor is solid, it cannot be pushed up, and its size is so great as to render an extraction of the foetus altogether impossible. The case is then most serious, and we have only to choose between an extirpation of the tumor, or a resort to embryotomy or to the Cæsarean operation. Under such circumstances, if it were possible to ascertain that the abnormal growth had not contracted intimate adhesions to the neighboring parts, I would willingly adopt the views of Merriman, who recommends its extirpation; but if this latter be deemed impracticable, a mutilation of the child might be resorted to, when there is room enough between the tumor and the pelvic wall to afford a passage to the foetus grasped by the embryotomy forceps; otherwise, the Cæsarean operation seems to be the only resource.

The following summary, which will serve to illustrate the danger of the operations just recommended, is extracted from M. Puchelt's statistics : in five cases, where the accouchement was abandoned to the resources of the organism, four of the mothers died, and but two children were born living. The simple pushing up of the tumor was only followed by the safety of both individuals, in a single instance, while in another case the infant was stillborn; the version was performed twice, after having previously pushed up the tumor, but this double operation was only once successful, for the woman and the child, though born living, died immediately afterwards; but in the other, both mother and child perished; a simple puncture of the tumor was attended with success in one case, though in two others it did not obviate the necessity for embryotomy, and both women died; the incision of the mass, which was made in three instances, was favorable to both individuals in a single case only, while in the other two the children perished; in a fourth, the version was effected after the incision, but both mother and child were lost; the same result attended the application of the forceps in one case; a perforation of the cranium was found necessary in six, and only three of the women recovered; and, finally, both parties survived in those instances where the blunt hook could be employed.

§ 2. TUMORS APPERTAINING TO THE FALLOPIAN TUBE.

As the tumors of the tube are much more rare than those of the ovary, they very seldom constitute a mechanical obstacle to the delivery. In fact, only one case of the kind is on record, that related by Chambry of Boulaye, in the old *Journal de Médecine, Chirurgie et Pharmacie*. It appeared as a round, hard, irregular, and partly osseous tumor, the true seat of which was subsequently ascertained by the *post-mortem* examination. If a similar case should be met with, it would offer the same indications for treatment as the ovarian tumors.

§ 3. TUMORS OF THE RECTUM.

A. The fecal matters may accumulate in the rectum, where they become more consistent and harder, and give rise to unpleasant symptoms, which sometimes simulate a regular disease of the intestine; and if such an accumulation takes place towards the end of pregnancy, it may render the accouchement difficult or even impossible, by retracting the passages the foetus has to traverse. In several of the reported cases, the administration of injections could not be made, and laxatives given by the mouth proved ineffectual. For instance, Guillemot says, "We were constrained, before delivering her, to extract all the excrements which distended the said large bowel;" and Lauverjat likewise remarks, "I introduced my finger into the vagina, and pressed on the matters with the view of diminishing their solidity; I then gave two injections, which soon emptied the intestine; the pains, which had been completely suspended for six hours, reappeared, and the labour was terminated in less than

fifteen minutes." Under like circumstances, I know of nothing better than to follow the example of these practitioners.

A curious case, in many respects, is reported by Fournier, who says: "I was sent for by three surgical students, who had been ineffectually attempting to deliver a woman for five days. Having ascertained, on my arrival, that she was costive, and had not had a passage for a week, I immediately directed an injection. The student, charged with this duty, endeavored in vain to find the anus; and, on going to his aid, I discovered that it was imperforate, and that no vestige whatever of an orifice remained; but, instead, a line similar to the raphe, extended from the coccyx to the vulva. I introduced my finger into the vagina, where I found the rectum floating, and as it was filled with excrement compressing the womb, the canula was introduced there, and the injection penetrated into the intestine, from whence a prodigious quantity of cherry-stones, mixed up with fecal matters, came away at once; and after this evacuation, I terminated the labour. (*Dict. Sci. Méd.*, tom. iv. p. 155. *Cas rares.*)

B. *Scirrhous*.—Dr. Lever relates having met with a case where the travail was rendered difficult by the presence of a cancerous tumor situated three inches above the anus. But such tumors rarely acquire a large size, and the application of the forceps would nearly always prove sufficient to overcome the obstacle.

§ 4. TUMORS OF THE BLADDER.

The tumors in the pelvic excavation, dependent on the bladder, may be caused either by a *procidentia vesicæ*, a cancer of this organ, or a urinary calculus. In addition to which, we have elsewhere spoken of the unfavorable influence that an excessive distension of this reservoir might have over the puerperal functions.

A. *Procidentia Vesicæ* (Falling of the bladder).—Under this title, certain authors have described an inconsiderable displacement of the bladder, but which does not the less constitute a true hernia of the organ; and we shall, therefore, refer our remarks on this subject to the article where hernial tumors are treated of in detail.

B. *Cancer of the Bladder*.—Puchelt extracts one case of this disease from Herteufer, and Dr. Lever reports another; both of which would seem to prove that the vesical walls, when attacked by cancer, may form a tumor in the excavation large enough to obstruct the course of parturition. As to its treatment, this tumor evidently presents the same indications as all the other solid ones before described.

c. *Urinary Calculi*.—Instances where a stone in the bladder hangs down into the excavation, and thereby opposes the head's free passage, are not very unusual. The numerous cases of the kind on record, prove that they are always situated below the head, or else are placed between it and the symphysis pubis. In a single instance only, reported by Lauverjat, the calculus was above these bones, though, as M. Velpeau remarks, it is difficult to understand how it could then arrest the expulsion of the fœtus.

Calculi vary very much in their size, and the same is true of their shape, which fact modifies the prognosis. But the diagnosis is not always an easy matter, though, if the tumor felt behind the symphysis pubis is hard, circumscribed, and gives rise to pain when pressed upon by the finger or the child's head, if it is situated without the vagina, and if it is firmly fixed during the contraction, but is movable during the relaxation of the womb, there is every reason to suspect the existence of a calculus; which suspicions would naturally lead us to the use of the catheter, whereby the foreign body can nearly always be detected.

Treatment.—An attempt should be made to press up the stone above the superior strait, before or even during the travail, and prior to the engagement of the head; or, if the latter is still movable—although it may be engaged—it should be raised up from the strait, and the calculus be pushed above it. But, unfortunately, it is not always possible to do this, either because the head has descended too far to be pressed back (the stone being below it), or because this latter is forcibly wedged in between it and the symphysis. In such cases, an extraction of the calculus seems to be the only resource; however, this need not be attempted at once, for some of the reported facts would seem to prove that its spontaneous expulsion may take place, even where its great size might preclude all hope of such an event, as occurred in the following case reported by Smellie. The wife of a coal porter, who had long been suffering from the presence of a stone in the bladder, became pregnant. The midwife, summoned at the time of labour, was surprised to find a hard resistant body lying before the head, but, as the means of the patient did not admit of her sending for a physician in consultation, the midwife could only keep up the spirits of her patient during this long and painful parturition. At last, she felt something coming away, which proved to be a stone about the size and shape of a goose's gizzard, and which weighed from five to six ounces. Immediately after its escape, the child was expelled, and the woman recovered in due time, but she afterwards suffered from an incontinence of urine. Some surgeons have been encouraged, probably by facts of this kind, to attempt an extraction of the calculus through the previously dilated urethra; but this operation requires too much time to admit of being performed during the progress of parturition. If there should be no hope of succeeding by the forceps or pelvic version, on account of its large size, it would be necessary to resort to the operation of vaginal lithotomy, and incise the urethra directly on the stone through the anterior vaginal wall.

§ 5. OF THE TUMORS DEVELOPED IN THE CELLULAR TISSUE OF THE PELVIS.

We have yet to treat of the fatty, the fibrous, and the cancerous masses, and of the abscesses, or encysted tumors, that may be developed in the cellular tissue of the lesser pelvis, nearly all of which are situated in the substance of the recto-vaginal septum, though they are occasionally found in the sides of the vagina. In one

instance, reported by Ed. Meier, the accouchement was rendered impossible by the existence of a cyst between the uterus and the bladder, about the size of a child's head. As to the steatomatous and cancerous tumors, they are usually found in contact with the osseous or ligamentous walls of the pelvis, to which they seem to appertain.

It must be apparent that there is an identity of nature and seat between the tumors of the cellular tissue and those of the ovary; the reducibility of the one (when non-adherent) and the irreducibility of the others constitute the only marked difference between the two. Consequently, the diagnosis is not easily made out after the head's engagement, or when the ovarian tumor is retained in place by old adhesions; but, fortunately, that would be an error of little importance, since both present the same indications for treatment. It is more easy to distinguish the tumors of the cellular tissue from those appertaining to the organs before spoken of, and we refer to the signs then given, as characteristic of each of them.

The reader will understand that the prognosis likewise varies according to the size, nature, density, and seat of the false growth. When small, compressible, and situated in the direction of one of the long pelvic diameters, it will most frequently permit a spontaneous termination of the labour; and this may also take place, if, notwithstanding its hardness and size, it still retains a certain degree of mobility. Even in those cases where it is impossible to push it above the superior strait, we may still hope that, being forcibly pressed by the child's head, it will permit the latter to pass. During my sojourn at *la Clinique*, I saw a woman, in whom the child's head was arrested at the superior strait for a long time, by a tumor, which was probably fibrous in its character, and was situated in front of and on a level with the sacro-iliac symphysis. An application of the forceps had been seriously thought of, but the tumor, located in the recto-vaginal septum, was gradually forced down by the head, under the influence of strong contractions, as far as the floor of the pelvis, where it was pressed backward by impinging on the perineum itself, and the labour then terminated by the birth of a living child.

In many cases, the volume and permanence of these tumors do not permit us to anticipate so happy a result, and it will then be necessary to interpose; and the indications to be carried out will vary according to the particular case; that is, where an abscess or an encysted tumor is detected, it is to be punctured, so as to evacuate the liquid, or it is to be incised when the contents cannot be removed by a simple opening; but where the tumor is solid, and is easily accessible, and it has contracted no intimate adhesions with the vagina or rectum, it ought to be extirpated. Two modes of operating have been recommended for this purpose; in the one, the vaginal wall only is incised, while in the other the tumor is reached by making an opening in the perineum. The success obtained by Drew and Burns pleads in favor of the latter procedure. In the worst cases, where the situation of the tumor, or the numerous and firm adhesions which it has formed, render its extirpation

wholly impracticable, our only resources are in the obstetrical manipulations, properly so called; namely, the application of the forceps or tractions on the feet, if the tumor is not very large, and the Cæsarean operation, or embryotomy, if the excavation be so obstructed that the extraction of a living infant is impossible.

§ 6. OF THE HERNIAL TUMORS.

A considerable portion of the intestine, omentum, or bladder, may become engaged in one of the culs-de-sac formed by the peritoneum, in being reflected from the bladder to the womb, and from the latter to the rectum, and thus constitute a true *vaginal hernia*. But when the parts that are displaced and engaged between the rectum and the vagina descend still more, and cause a prominence in the perineum, the term *perineal hernia* is applied.

A. *Intestinal or Omental Hernia*.—The seat of a vaginal enterocele, or epiplocele, is sometimes between the vagina and bladder, but more often between the rectum and the posterior wall of the vulvo-uterine canal, or rather on one side of it, in consequence of the vaginal adhesions both behind and in front. The misplaced organ forms a tumor there which is very variable in its size, and which either presents the clammy softness of epiplocele, or the elasticity and rumbling of an enterocoele. Though easily recognized, these tumors have, in some instances, given rise to serious mistakes, which might have proved disastrous to the patient. I was summoned, says Levret, to a case of this kind, where the question was actually discussed whether a large portion of the tumor should be removed or not; but I demonstrated, in a satisfactory manner, that some part of the intestine had slipped down into the substance of the septum, through the bottom of the cul-de-sac that is found between the neck of the womb and the upper part of the rectum. (Levret, *Abus des regles*.)

The prognosis is unfavorable, not only from the obstacle thereby created to the expulsion of the infant, but also from the pressure of the child's head on the hernial sac; because an inflammation, that is always serious, and which might sometimes even terminate in gangrene, may result in consequence. All the authors have, therefore, recommended the reduction of the hernia as soon as possible.

To accomplish this, it is better to place the woman on her knees and elbows, so as to facilitate the return of the intestine and the engagement of the head; this position was followed by the happiest results in the case above reported. In another instance, Stubbs, by compressing the hernial tumor, succeeded in reducing it by the taxis, and the head then engaged. In my estimation, the taxis should be preferred to Levret's method, taking care to sustain the head at the same time with the other hand, if the hernia be voluminous. Where the reduction is impossible, it is necessary to terminate the labour in the promptest manner by the aid of the forceps, or by the version.

B. *Vesical Hernia, or Cystocele*.—It sometimes happens during labour that the bas-fond of the bladder descends below the head and

constitutes a tumor of a variable size at the anterior-superior part of the vagina; the descent being probably caused by the pressure made by the child's head or the inferior part of the womb, on the fundus of this organ. The patient has a feeling of weight or fullness in the pelvis, and a dragging sensation about the umbilicus; she has a constant desire to urinate, without the power of emptying her bladder, though, at times, each uterine contraction is followed by the emission of a small quantity of urine; besides which, a more or less oval tumor, that is smooth, soft, and fluctuating between the pains, but is hard and tense whilst they last, is detected by the touch at the upper front part of the vagina; and above this the head can often be distinguished; indeed, the finger may easily slip behind the tumor, and reach the cervix uteri; but it cannot pass between the former and the pubic symphysis.

The tumefaction formed by a cystocele is occasionally quite large; as, for example, Madame Lachapelle says "the first thing that attracted our attention was a pediculated tumor about the size of an egg, which commenced a little distance from the vulva, and seemed to be attached to the right anterior wall of the vagina near its middle. The pedicle was about an inch and a half in thickness, and the tumor contained a liquid, all of which could be pressed back through the pedicle; an opening with a thick margin was then detected, which appeared to communicate with the bladder. In fact, according to the woman's account, the tumor augmented in size in the erect position, and though it often disappeared after the emission of urine, it constantly reappeared when using the cold bath. The uterine pains increased the size of the hernia, and the head in descending compressed, and rendered it very tense; after having emptied the bladder, I reduced it, and recommended the students to support it with two fingers during each contraction of the womb. The head soon cleared the passage, sustaining the hernia itself, and the labour terminated favorably."

The tumor is nearly always seated at the anterior part of the vagina; but, in a case reported by Sandiford, it was located between this canal and the rectum.

There is one variety of cystocele, formed in the pelvic cavity, which is the more worthy of attention, as its true nature might be misunderstood from its singular situation. It depends on a lateral displacement of the bladder, and M. Christian assigns to it the following characters, namely: a remarkable fullness on one side of the basin, more especially during the uterine contractions, which give to the tumor an evident elasticity and tension; it is generally circumscribed, though its base is somewhat spread out, and extends along the side of the pelvis as far as the sacrum; its volume varies, of course, with

Fig. 78.



Vaginal cystocele. taken from
Ramsbotham.

the quantity of fluid contained in the sac occasionally equaling one-third of the excavation's transverse diameter.

The tumefaction completely disappears after the use of the catheter; and, by directing the concavity of the instrument downwards, its point can be felt through the walls, and can readily be moved from before backwards in a horizontal direction. As the tumor is covered by the vagina, and its base is diffuse, there is no danger of mistaking it for the bag of waters, since it does not prevent the finger from reaching the uterine orifice. The cystocele is sometimes removed by the pressure of the presenting part, and it can nearly always be relieved by the catheter; its size will vary with the extent of displacement, and with the quantity of urine enclosed in it.

Cases of this kind merit serious attention, for they may be confounded with other tumors; and such an error of diagnosis might lead to the performance of a useless and perhaps dangerous operation. Dr. Merriman (*Synopsis*, page 202) speaks of a surgeon, who, supposing he had to treat a case of hydrocephalic head, thrust a sharp instrument into the bladder; and a similar mistake, according to Hamilton, was committed by another practitioner, who imagined he was opening the bag of waters.

In all these obscure cases, a resort to the catheter is the best possible means of diagnosis; nevertheless, it must be observed, that, for this measure to be conclusive, it should be done in such a manner that the beak of the sound be plunged into the liquid contained in the cavity of the tumor; that is, after the instrument has once entered, it should be turned over so as to make its concavity look downwards and backwards. As a remedy, this is the only one requisite, and the instrument ought to be left in the bladder until after the head is engaged.

Unfortunately, its introduction is not always an easy matter, particularly where the head has been wedged in the basin for a long time; under such circumstances, an attempt should be made to press up the former during the intervals; but if this is impracticable, and there is reason to fear a rupture of the bladder from its over-distension, I know of no other resource than to puncture the organ with a very delicate trocar.

CHAPTER IV.

OBSTACLES DEPENDENT ON THE NECK AND BODY OF THE WOMB.

ARTICLE I.

OBSTACLES DEPENDENT ON THE NECK.

THE obstacles to the delivery which the cervix uteri may present, are owing either to a rigidity of the orifice or to its obliquity, to an agglutination and complete obliteration of the lips, or to a scirrhouss or other degeneration of its tissue.

§ 1. RIGIDITY OF THE NECK.

Under certain circumstances, the fibres of the uterine neck seem to possess an extraordinary degree of resistance; and although they have none of the characters we are about to indicate as appertaining to an inflammatory or spasmodic retraction, yet their dilatation is not effected. According to Dewees, this resistance in the cervix uteri is particularly apt to be met with in very young girls, or in middle-aged women in their first labours, and also in those cases where the parturition takes place prematurely.

The only measures then requisite are frequent tepid bathing, especially at the beginning of the travail, with the subsequent application of the extract of belladonna on the cervix, and bleeding in the arm, if the general condition does not forbid it.

The rigidity of the neck is sometimes such, at the commencement of labour, that the orifice is thin, resistant, hot, dry, and painful to the touch; in a word, much more irritable than usual. The dilatation is then exceedingly slow, and all the mechanical means usually recommended for facilitating this process are so painful that we are obliged to renounce them.

There is one symptom that would lead us to suspect a rigidity of the os uteri, even before an examination; we allude to what is ordinarily termed the pains in the loins. These have always appeared to Madame Lachapelle to exist as a consequence of the rigidity of the external orifice, either from its experiencing a kind of cramp, or, from its having to sustain the whole force of the uterine contractions by its firmness, it suffers more than when soft and yielding.

Again it happens that, after having already attained a considerable degree of dilatation, the cervix is affected with a spasmodic retraction, whereby its subsequent expansion is retarded, or is suspended altogether for several hours; and this condition, which has been

designated under the name of the spasmotic contraction of the os uteri, has often been confounded in practice with the neck's natural retraction after a premature discharge of the waters. The dilatation of the external orifice is then effected with much difficulty, but still the action of the womb most generally overcomes the resistance, and the head clears it; but as soon as the presenting part has passed, it retracts again, and embraces the child's neck, and it has to dilate anew to permit the passage of the shoulders; which secondary dilatation is not always so easy as might be supposed.

But it is not the external orifice alone which may retard the delivery of the foetus by retracting on the child's neck, for very often the internal one, or rather that portion of the uterine walls which corresponded to it in the non-gravid state, retracts forcibly on the infant's neck, even before the head has cleared the external orifice; in such a way that the latter, being retained in the portion of the organ that appertains to the neck after delivery, can advance no further. This internal contraction only takes place where the waters have escaped for some time, and it evidently results, as Dewees has remarked, from the double tendency of the womb to regain its primitive form, and to accommodate itself to the shape of the parts contained within its cavity.

There is every reason to suspect that the delay in the progress of the head is dependent on this cause, when, notwithstanding the energy of the pains and the absence of all other sources of dystocia, it is found to make no advance at all, or, even if it approaches the vulvar orifice during the contraction, it returns to its primitive position immediately afterwards. Besides which, if the finger is then slipped above the head, the latter will be found free in the excavation; but one of the orifices (the internal one, most usually) will be strongly retracted around the neck.

The rigidity and spasm of the cervix uteri are very frequently connected with a state of plethora, and then a general venesection is one of the first measures to be employed; accompanied by emollient injections, fumigations, baths, and the administration of laudanum by clysters, or, preferably, the application of belladonna to the uterine neck itself. Chaussier, who has particularly recommended the use of this latter remedy, was in the habit of using an ointment prepared by mixing and triturating one drachm of the extract or juice of belladonna with an ounce of lard. But as the application of this ointment is quite difficult, Professor P. Dubois prefers the ordinary dry extract. He places a little pellet of it, about the size of a pea, on the nail of the index finger, which latter is then carried up to the cervix, where, in the course of a few minutes, the heat and moisture of the parts soften the extract, which is then readily smeared over the external and internal surfaces of the neck. If all these measures prove unsuccessful, and the version be judged necessary, the most serious difficulty may be anticipated in passing the hand through the retracted part; and if the application of the forceps be deemed requisite, as it would be if the head were already engaged, but delayed by the retraction of the internal orifice, this

latter circumstance, by arresting the shoulders, would render the delivery impossible. It is then we must have recourse to the measure so much vaunted, and so often employed by Dewees with success, namely, to bleeding in the arm, pushed *ad deliquium animi*. But, in order to avoid drawing too great a quantity of blood, the patient should be directed to stand up, if possible, and, as soon as fainting occurs, she is to be replaced on the bed; when, according to the American accoucheur, the relaxation in the retracted orifice, produced by the syncope, will be such that the pelvic version, or the extraction of the head by the forceps, can always be performed. Finally, in those cases where the woman's general condition does not permit a resort to blood-letting, we may employ the opiates in a full dose, either by the mouth or by injection, with great advantage.

The reader will also understand that, in a natural labour by the pelvis, the retraction of one of these orifices may likewise arrest the head. Under such circumstances, if the source of difficulty is confined to the external one, numerous incisions might be made in the ring of the os uteri; but, if it is at the internal orifice, Dewees' plan should certainly be followed. It is likewise important to ascertain, at once, whether the child is still living; for though it be difficult to admit that a strangulation of the foetus can occur from direct pressure, yet it is not the less true that the umbilical cord, from being nearly always compressed in these unfortunate cases, exposes the child to a speedy death; and, if the infant is already lost, we may employ, beneficially, either belladonna, or the opiates internally, according to the orifice that is retracted.

§ 2. OBLIQUITY OF THE ORIFICE.

It has elsewhere been shown, that the cervix is usually directed somewhat backwards, in consequence of the anterior inclination of the womb; besides, the dilatation of the orifice is effected more at the expense of the posterior than of the anterior lip, and, consequently, the plane of this opening would naturally be found, in most cases, behind the long axis of the organ. Wherefore, this irregular dilatation may, independently of any deviation in the fundus, produce such an obliquity of the neck, that the plane of its orifice, instead of being horizontal, has very nearly a vertical direction; that is, the opening looks directly towards the anterior face of the sacrum, its anterior margin has become inferior, and its posterior one is now the superior. Consequently, when the child's head is urged on by the uterine contractions, it presses the anterior-inferior wall of the uterus before it, and thereby evidently retards the accouchement. In fact, the neck's dilatation must necessarily be very slow and imperfect, because the expulsive efforts are spent against the anterior part of the cervix; which part, corresponding to the void in the pelvis, and being distended by the head, is sometimes forced down nearly to the vulva, and threatened with a rupture. Most generally, there is time for rectifying this unfavorable situation of the cervix; nevertheless, the patient must remain in bed as much as possible; for it is very apparent that, in the erect position, the body of the

womb constantly augments this posterior obliquity in the neck by being carried forwards. The termination of the labour may also be facilitated by placing the orifice in its natural position with the finger; this is done, during the interval, by hooking the anterior lip, and carefully bringing it to the centre of the vagina, and then sustaining it in this position until a new contraction comes on; when the head is forcibly pressed down and engages in the opening, and no longer permits the lip to regain its abnormal position. The travail is sometimes speedily terminated after this little manœuvre.

It occasionally happens that the cervix uteri is well dilated, though not as yet sufficiently so to permit the parietal protuberances to traverse it; and this condition of things lasts for a considerable period, notwithstanding the long and acute sufferings of the patient. In such cases, the head's engagement may be singularly facilitated by making a slight pressure on all the periphery of the orifice with the extremity of the index finger.

Again, the dilatation may often be completed and the head be down in the excavation, but, notwithstanding the expulsive efforts of the womb, it is retained there by the anterior moiety of the neck, which is pressed before it; the head cannot overcome the resistance thus made by the band formed by the anterior lip, and several hours may elapse without any advance in the progress of the labour. When this happens, the following course should be adopted in order to promote a prompt engagement at the inferior strait: taking advantage of an interval, the accoucheur hooks the anterior lip with his finger and draws it towards the symphysis pubis, where it is retained until the pain comes on; then the extremity of the finger, placed under this portion of the neck, pushes it above the descending part of the head, until it gets beyond the occipital boss; when the occiput is found to engage almost immediately in the pubic arch, and the accouchement terminates two or three hours sooner than it would have done without this little manipulation. It is occasionally necessary to repeat these attempts several times; but as they are attended with no inconvenience, when properly performed, they may be renewed without fear. We will add, that the most favorable period for this purpose, is that when the head, after having reached the pelvic floor, is on the point of clearing the inferior strait; provided the pains are energetic, and the cervix uteri is sufficiently dilated to permit the passage, if the axis of its orifice were parallel to the axis of the head.

§ 3. AGGLUTINATION OF THE EXTERNAL UTERINE ORIFICE.

This is a very rare complication, and but a few examples of it are reported in the books; though, perhaps, as M. Nægèle remarks (from whom I extract the following details), this rarity is owing to the fact, that the various degrees of agglutination have escaped the notice of the physician; the powers of nature alone triumphing over the accident in most cases.

Its existence may be suspected when the inferior uterine segment descends low down in the excavation at the commencement of the

travail, and offers no trace of an orifice ; or when the latter presents as a fold or a hollow, which is slightly depressed at its centre, and very often not corresponding to the pelvic axis. The middle of this little depression is usually occupied by a filamentous web, some fleshy tissue, and a cellular network, in the centre of which a small retracted opening is found ; sometimes the lips are held together by a consistent mucus. As the contractions become more energetic, the lower segment of the womb is forced into the excavation, and it becomes so thin that, at the first exploration, the finger appears to be separated from the head by the membranes alone ; but notwithstanding the strength of the pains, the uterine orifice is not only tightly closed, but even seems to ascend somewhat, and to be carried towards one side. The orifice may open spontaneously under the pressure of the energetic contractions ; but if it resists, and the accoucheur does not early recognize the source of the difficulty, a rupture of the womb, or a paralysis of it, which is not less dangerous, might result in consequence.

The question arises, what is the nature of this agglutination ? It has probably followed an inflammation of the cervix uteri, and the upper part of the vagina ; since the pseudo-membranous or fibrous tissue that composes it, is similar, says Nægèle, to that substance which serves as the bond of union between the placenta and matrix, or that uniting the pleura pulmonalis to the pleura costalis, or the intestines with each other and with the abdominal wall, when an inflammation of these parts terminates by adhesion. In a case where a woman died during labour, the adhesion of the neck was found, at the *post-mortem* examination, to be so resistant that it could neither be lacerated nor broken by any moderate force, and the membrane that blocked it up was of an aponeurotic character.

The precise period at which its formation commences cannot be determined. In a woman who presented this peculiarity during labour, the orifice was still patulous six weeks after her delivery.

The agglutination of the orifice has been remedied in most cases without much difficulty, the membrane having been easily ruptured either by the finger or some blunt instrument, and the operation has generally been followed by the loss of only a few drops of blood. The index finger should be preferred to everything else, for if this is not sufficient to break down the obstacle, we can expect but little aid from an instrument. It is really difficult to understand how this agglutination, which almost always yields to the pressure of the finger, can resist the impetus of the strong contractions of the womb.

§ 4. SWELLING AND ELONGATION OF THE ANTERIOR LIP.

In practice, it is not at all unusual to find the head descending in the excavation long before the complete dilatation of the os uteri, whereby the anterior lip is necessarily compressed between the former and the symphysis pubis. As a general rule, this compression, and the consequent pain, disappear on the prompt termination of the travail ; but if the latter be prolonged, and more particularly

if the pelvis scarcely reaches its normal dimensions, and the compression is very severe, a considerable tumefaction will result in that part of the anterior lip found below the constricted point. Duclos, of Toulouse, has met with three instances of this kind, two of which were in the same woman; M. Nægèle has published another, Dr. Lever two more, and M. Danyau one, making seven in all. The following case is one of those reported by Duclos: A woman, of thirty-four years of age, who was in labour with her fifth child, was suddenly attacked after twenty-four hours of moderate pains by acute sufferings, which called forth loud cries; an elongated body appeared between the lips of the vulva, and this apparition was accompanied by a slight hemorrhage, pallor, and feebleness. On his arrival, he found a cylindrical tumor projecting four fingers' breadth beyond the parts; it was two inches broad near the vulva, and was irregular, resistant, and of a wine-like color. After a careful examination, he ascertained that it was formed by the elongated and tumefied anterior lip of the cervix; and he first thought of applying the forceps on the child's head, but afterwards concluded to aid its delivery by drawing on the occiput, and operating on the forehead by means of the index finger previously introduced into the rectum. In the cases observed by Nægèle and Danyau, as also in one of the women reported by Lever, the labour terminated spontaneously. There is, therefore, nothing to be done in most instances; though if the tumor be of a large size, very tense and black, and apparently threatened with gangrene, the example of the English surgeon, just named, might be followed; that is, to make a number of punctures for the purpose of evacuating the infiltrated liquids and diminishing its volume.

On the whole, then, I may remark, with M. Danyau, that this species of tumefaction can scarcely be considered as a mechanical obstacle to the delivery; and, therefore, the unusual length of the labour must rather be attributed to the extreme pain it occasions, and to the disorder and irregularity caused by this pain in the uterine contraction.

§ 5. ABSCESSSES IN THE LIPS OF THE CERVIX UTERI.

Genuine abscesses are occasionally developed in the substance of the os tincæ, which, independently of the unfavorable influence they may have over the gestation, must necessarily disturb the regular progress of the labour; because, where they invade a considerable portion of the neck, its dilatation is thereby rendered very slow, and very painful; besides which, their size may be so great as to retard the head's passage. The reader will find in Bonet (*Sepulchretum*, vol. ii. lib. iii., sect. 38, Obs. 2) the history of a woman, who died without having been delivered, after five or six days of suffering, in whom a large abscess filled with putrid pus, and occupying the neck of the womb, was found at the *post-mortem* examination.

§ 6. INDURATION, WITH HYPERSTROPHY OF THE CERVIX UTERI.

This affection is more frequently observed in the anterior than

the posterior lip, though it may affect both; but, in no case, has the volume of the indurated part been large enough to impede, mechanically, the expulsion of the child; but the alteration very often retards the dilatation, and sometimes even renders it impossible; and then venesection and tepid bathing may be resorted to with advantage. Certain English practitioners highly extol the use of tartar emetic, given in nauseating doses, but I have not had an opportunity of testing its efficacy. If these means prove ineffectual, or if some more grave complication requires the prompt termination of the labour, we might have recourse to repeated incisions made on the neck of the womb.

§ 7. OF THE CANCEROUS NECK.

Like all the organs of the economy, the cervix uteri may be affected with scirrhus, or may form an encephaloïd tumor; and where this does take place the prognosis is very unfavorable, both for the mother and child. For example, in twenty-seven females reported by Puchelt, five died during the labour, nine shortly after the delivery, and but ten recovered; the fate of the other three is not stated. However, if the disease is still in its first stage; if the patient's general condition is not seriously altered; and especially if the malady has made but little progress, or the tumor is small, the danger is not so imminent, and the child's expulsion may then take place regularly. But, even where the accouchement is effected spontaneously, its influence over the subsequent progress of the tumor is not the less disastrous; for the pressure to which the diseased part is exposed seems, in most cases, to hasten its development; and, whether the travail be terminated naturally or by the resources of art, its progress afterwards is much more rapid. The child, likewise, is very often lost in the cases under consideration; thus, of the twenty-seven women above cited, fifteen were delivered of a stillborn child, and ten only of a living infant; nothing is said of the fate of the other two.

The indications for treatment, when the cervix uteri is affected with cancer, will necessarily vary, according to the seat and size of the tumor; for, if it is not very voluminous, or if it is located on the posterior lip, or the pelvis be of large dimensions, there is every reason for hoping that the efforts of nature will prove adequate to the dilatation of this part, and the expulsion of the foetus.

I have seen the former process effected at the expense of the sound anterior lip, where the other was invaded by a cancer throughout, which also extended to the posterior vaginal wall.* Wherefore,

* This case appears to me too remarkable not to be reported, at least in a condensed form.

A female, aged forty-five years, who had previously had several children, came to *la Clinique* about the commencement of the last month of her gestation; when, by resorting to the touch, it was ascertained that the posterior vaginal wall was occupied throughout by an elongated tumor, which was curved in a serpentine form, and extended from the posterior lip of the cervix, to within a finger's breadth of the vulva. This lip was nearly an inch thick in all its

there is no occasion for immediate action; although it must not be forgotten that, if the degeneration of these parts is more extensive, the powers of nature alone are nearly always inadequate to the accomplishment of the delivery.

Some authors have recommended copious bleedings; but sanguineous emissions, though advantageous in cases of rigidity, or of simple induration of the neck, would here only enfeeble the patient without producing any influence on the condition of the cervix; and the only available resource of our art is still in the repeated incisions on the periphery of the cancerous mass; because the version, and the application of the forceps, which have been advised by certain accoucheurs, are evidently only practicable where the bistoury may have previously facilitated the entrance into the womb; for, without this precaution, one or more fissures dividing the lobes of the scirrhus would necessarily result from the introduction of the hand or instrument, which, at the moment of the head's passage, would extend still further, and encroach perhaps on the body of the womb. Or, if the fissures should not form, the neck, by not dilating, would create an obstacle to the delivery, and the patient would be exposed to a rupture of the organ, to convulsions, and to all the consequences that attend accouchements rendered difficult by mechanical impediments; unless, indeed, there happened to be a rupture of the sub-vaginal portion of the womb itself, and the child's passage was effected through this accidental orifice.

Lastly, in those cases where the application of the forceps is still impossible, even after the incisions have been made, a grave question is offered for our solution; and, supposing the child is still living, we have only to choose between its mutilation and the Cæsarean operation. Though this last operation be serious under all circumstances, it nevertheless seems preferable here to the first, because it almost affords a certainty of saving the child; and the mother's life is already so greatly compromised by the disease with which she is affected, that we should not, in my estimation, hesitate to sacrifice all to the safety of her infant.

transverse extent (which latter was more considerable than usual), and it had contracted adhesions with the vagina by its posterior face. The tumor presented nearly the same thickness in all parts; its anterior surface was irregular and nodulated, as was also the posterior lip of the cervix uteri; but its hinder surface adhered to, or rather was confounded with, the recto-vaginal septum. When this woman arrived at full term, the labour regularly began, and the dilatation was effected very slowly, though completely, at the expense of the anterior lip. The tumor, whose volume seemed to offer an insurmountable obstacle to the delivery, only rendered the second stage of the travail a little more tedious than usual; for, being pressed back by the child's head, it became nearly transverse in the excavation, and formed on the perineum a pad, or a kind of crescent, the convexity of which looked downward, but its concavity was directed upwards, and arrested the head; finally, under the influence of the powerful contractions, the head pushed the tumor still more backwards, by forcibly depressing the perineum, and then passed in front of it, and soon cleared the external parts.

§ 8. THE COMPLETE OBLITERATION OF THE CERVIX UTERI.

At the present day, it is an ascertained fact that the neck of the womb may be entirely obliterated at the time of labour; and, where a case of this kind does occur, the vaginal Cæsarean operation should doubtless be performed. But it is an exceedingly rare occurrence, and the accoucheur must not permit himself to be deceived by a well-marked obliquity of the cervix, which would render the orifice of difficult access, nor by an agglutination of the lips of the os tincæ, since it is possible for an over-lapping of the two latter to be mistaken for an absolute obliteration of the orifice. "Several times," says Dugès, "we have found the anterior lip covered and embraced by the posterior one, which thus masked the opening, so that the finger could only penetrate it in a very oblique direction; though, when effected, this introduction furnished a means of rectifying the error promptly, and of reducing the parts to a more favorable state."

ARTICLE II.

OBSTACLES DEPENDENT ON THE BODY OF THE WOMB.

§ 1. OF UTERINE OBLIQUITY.

When studying the phenomena of gestation, we enumerated the various causes that forced the uterus to depart more or less from the direction of the pelvic axis; and we demonstrated that, under the influence of those causes, the womb very often inclines forwards and to the right during the latter months of pregnancy. It is not, therefore, of this right antero-lateral inclination we are about to speak, in treating here of the uterine obliquities as a cause of dystocia; because, where this is slight, and where it may be considered as a normal result of the development of the womb, it affords no obstacle to the parturition; but, when the uterine obliquity is more extensive, it may impede the child's spontaneous expulsion, and will, therefore, claim our attention.

Deventer, and most of the writers on this subject since his day, have described four varieties of it; namely, the anterior, the posterior, the right lateral, and the left lateral obliquity. But the modern accoucheurs, such as Baudelocque, Gardien, Desormeaux, and P. Dubois, believe that a posterior obliquity cannot take place; for the prominence of the sacrum and of the lumbar vertebrae, they say, prevents the uterus from being carried backwards; however, from the facts reported by Deventer, Levret, Merriman, Dugès, and Velpeau, we feel warranted in still retaining these four varieties.

1. *Of the Anterior Obliquity.*—As a natural result of the resistance afforded by the posterior abdominal plane, the womb inclines to the front, where it only encounters the abdominal muscles, which form a soft and an extensible wall. When this obliquity is inconsiderable, the physician has only to remain a simple spectator of the efforts of nature; but, when it exists in a higher degree, it be-

comes a source of annoyance and pain during the latter months of gestation that demands attention; and it also gives rise to difficulties in the course of the labour that should either be prevented or corrected.

An unusual inclination in the plane of the superior strait, or a well-marked laxity in the abdominal walls, favors the obliquity; and, where this laxity is carried to an extreme, the ventral muscles gradually relax and yield, the womb inclines more and more forwards and downwards, its fundus gets above the pubis, and then falls anteriorly, like an inverted sack, on the thighs. This displacement has been designated as the *ventre en besace*, and by the Latin authors it is described under the name of the *venter propendulus*. This displacement gives rise to acute pains in the groins, in the fore part of the thighs and loins, in those cases where the abdomen is not supported by a proper bandage during pregnancy; and, at the time of labour, the cervix uteri is carried so far back against the anterior face of the sacrum, that it dilates with the greatest difficulty; when, if the membranes be prematurely ruptured, or if the pelvis is unusually large, it nearly always happens that the child's head presses the anterior-inferior part of the uterine wall before it; which part appears at the vulva while its orifice is directed considerably upwards and backwards. But, if the basin be small, this engagement of the head does not take place, and the anterior uterine wall is then forcibly compressed between it and some portion of the superior strait. The enormous distension in the former case, and the pressure on the womb's inferior wall in the latter, expose this portion of the organ to a laceration or to gangrene. Under such circumstances, the abdominal exploration and the vaginal touch can alone explain the cause of the difficulties and pains which the patient experiences. The obliquity in the body is readily recognized by the external examination; and, if the head be engaged in the excavation, the finger introduced into the vagina will find a voluminous, smooth, and rounded tumor, filling up the whole cavity of the lesser pelvis, and upon which no opening similar to that of the cervix uteri can be detected; but, when carried further upward and backward towards the sacro-vertebral angle, it will reach (though at times with great difficulty) the anterior border of the cervix; but, most generally, it will be impossible to recognize the posterior lip. This circumstance has several times been mistaken for an imperforation of the womb, or a complete obliteration of the neck, and, as a consequence, the vaginal Caesarean operation has occasionally been performed, where nothing more than an obliquity of the uterus was to be remedied. If the head has not yet engaged, the tumor will not occupy the excavation, but the same difficulty will still be experienced in finding the cervix. Both of these modes of exploration should be employed; for we have already learned (page 507) that the cervix may be oblique, while the body retains its natural position; and it is evident that, under such circumstances, a resort to the touch alone might lead us to suspect an obliquity that did not really exist; and, on the other hand, the internal exploration would

guard against the errors that a deformed aspect of the woman's abdomen might possibly make us commit; for it alone can enable us to distinguish the obliquity in that vice of conformation already alluded to, under the name of anteflexion, in which the matrix is shaped like a retort. In the former case, the cervix will be detected high up towards the posterior plane of the pelvis; in the latter, on the contrary, it will correspond to the centre of the excavation, notwithstanding the great forward inclination of the body of the womb.

2. *Of the Posterior Obliquity.*—This variety of obliquity (which is denied, as above stated, by most modern authors), must be attributed to an excessive resistance on the part of the abdominal walls, which prevents the uterus from following the direction of the axis of the superior strait, when it rises out of the basin; that is, from inclining forwards, and therefore it is almost exclusively met with in women bearing their first child.

I cannot better describe the signs appertaining to this particular obliquity than by relating a few examples of it; and these citations will have the further advantage of verifying the fact, and of establishing its possibility.

I have twice had, says Merriman, from whom I extract the following case, an opportunity of observing this singular and unusual position of the uterus, in which the os uteri is carried so far above the symphysis pubis that it is inaccessible to the finger, and the posterior part of the pelvis so completely filled by the body of the womb that it is impossible to touch the sacrum. The first of these has previously been published by Dr. S. H. Jackson; but that occurred in a woman who had not reached full term. In the first of my cases, the woman was at term, and the travail continued for several days; but the uterus regained its ordinary position after severe efforts, and the labour terminated spontaneously: the child was stillborn, but the mother recovered. The other was published some time since in a dissertation on the retroversion of the womb, which has been sharply criticised by Dr. Dewecs. The following is an extract: "Mrs. F.—— was taken with symptoms of labour, on Monday, June 16, 1806, at which time a discharge of the liquor amnii began to be perceived, and pains recurred at distant intervals severe and apparently strong. In the course of the day, the patient was examined per vaginam, when there appeared to be a singular condition of the parts. The whole of the back part of the pelvis was filled up by a globular tumour, which prevented the finger from passing in the direction of the coccyx and sacrum, but it was obliged, in tracing the tumour, to take a direction towards the ossa pubis, above the crest of which it could be passed; but neither here nor anywhere else could the os uteri be felt.

"By introducing a finger into the rectum, it appeared that the tumour was uterine, and that some bulky part of the foetus was contained within it; but whether the nates or the head could not be clearly distinguished.

"On Tuesday, the 17th, the discharge of liquor amnii continued; the pains were frequent and excruciating, and the tumour was pressed down closer upon the perineum. A rigor, terminating in convulsions, and followed by fever and delirium, took place this day; but a prompt bleeding and evacuating the bowels, relieved these symptoms.

"Wednesday 18th, and Thursday 19th, no material alteration was observed. The pains continued regular and distinctly marked through these days, but were much less severe and distressing than at first.

"Friday, 20th, another very careful examination of the parts was made. The uterine tumour presented the same shape and bulk, quite obstructing the passage towards the sacrum, for even the coccyx could not be felt, except the finger was introduced into the rectum: when the finger in the vagina was carried forward, in the only direction in which it could pass, namely, anteriorly, it reached above the pubes, but still the os uteri could not be felt; yet, on withdrawing the finger from above the symphysis pubis, there was now, for the first time, perceived upon it, the true appearance of a show, which furnished a convincing proof that the os uteri was situated in that direction, and encouraged us to hope that an alteration in the state of the uterus was at hand.

"Our hopes were not vain; for, on the next day, Saturday 21st, a considerable alteration was discovered in the pains, and in the situation of the globular tumour, which occupied the pelvis. The pains were more powerful and effective, and the tumour, which had been contiguous to and pressing upon the perineum, was found to have a little receded, while a flattened mass (which proved to be the head of the child in a state of complete putrefaction, with the bones separated, and the brain almost dissolved) was forced down from above the pelvis, between the ossa pubis and the uterine tumour.

"After a few hours of active pains, the tumour ascended above the brim of the pelvis, and was no longer to be felt; but now the os uteri was easily distinguishable, though still very high.

"It was judged right to make an opening into the head, and about a pint of grumous blood and brains was evacuated; this allowed an opportunity of grasping the scalp, and, by means of this, so much assistance was afforded, in extracting the child, that the labour was terminated in a few more pains.

"The patient perfectly recovered, and lived many years afterwards in good health, but never had another child." (*Synopsis.*)

"In a woman," says M. Velpeau, "who came to be confined at my amphitheatre in the month of May, 1828, the fundus of the uterus was rather inclined backwards than forwards. The head of the foetus formed above the strait a considerable projection, which descended in front of the symphysis pubis nearly to the vulva. Besides, the ventral walls were so thin that the head, fontanelles, and sutures could readily be detected through them: the occiput was to the right and the face to the left. The right parietal bone rested against the anterior face of the symphysis pubis, and the left remained in front. The os uteri, which was on a level with the super-

rior strait, seemed to be scooped out of the substance of the posterior wall of the womb, which made it much longer behind than before. In order to reach the orifice, and penetrate towards the head of the child, I was obliged to bend my finger, so as to make it pass almost horizontally above the pubis. After seven hours of pain and pretty strong contractions, the os uteri, although very soft and very dilatable, was scarcely opened at all. M. Desormeaux agreed with me, that by means of position, and the assistance of the hand properly combined, I ought to try to carry the head to the centre of the superior strait, by making it slide from below upwards, and from before backwards over the pubis. I began to execute this manœuvre at half past eight o'clock, and continued it, alternating with several of the students, until nine o'clock. From this time there was no longer a tumor in front of the symphysis, and the labour progressed so rapidly that in less than an hour the child was born, and the placenta itself expelled." (*Meigs' Translation*, p. 404.) I might also add similar examples from Dugès; but these two are probably quite sufficient to render what is meant by the posterior obliquity of the womb fully understood.

By summing up the symptoms so well described by Merriman, we shall have: 1, a very considerable elevation of the os uteri, which is carried high upward and forward above the symphysis pubis; 2, a tardy dilatation of the cervix; 3, the tumor, constituted by some part of the foetus (the shoulder, probably), pressing before it the posterior-inferior portion of the womb that envelops it, is strongly engaged in the excavation, and occupies all the cavity of the lesser pelvis;* and, 4, the head is situated above the symphysis pubis. By collecting in the same way the principal characters of M. Velpeau's case, we shall find a remarkable elevation of the presenting part; a very unusual elevation of the cervix uteri, the orifice of which, being turned directly forward, is placed above the symphysis, and is scarcely accessible to the finger; and, lastly, a considerable tumor formed by the child's head, just in front of the anterior face of the symphysis. And we may add, that such a tumor had previously been described by Dugès, in several instances.†

The posterior obliquity of the womb is rarely so disastrous in its consequences as Merriman's case proved to be; for, most generally,

* It is highly probable that the engagement of the shoulder in the excavation is owing to the putrefaction of the fetus. Merriman has not noted the prominence formed above the symphysis pubis by the head; the absence of this projection, which was so remarkable in M. Velpeau's case, was certainly due to an engagement of the shoulder, and the head was probably thrown back on the opposite one, so that a spontaneous cephalic version took place.

† It has been remarked, in many cases, that the child's head presented, after birth, a red longitudinal mark between one of the parietal protuberances and the sagittal suture. This long narrow track seems to be owing to the contusion made on the scalp by the upper border of the pubis. In a case of this kind, reported by Paisley, the midwife could not detect the child's head until after the discharge of the waters. The head would not descend, and the woman died of exhaustion; and, at the autopsical examination, the frontal and parietal bones of the right side were found applied against the pubis, which had made a depression there of one or two inches in extent.

the strong contractions of the organ, and the energetic efforts of the patient herself, and a sufficient amplitude of the pelvis, succeed in overcoming its unfavorable influence, without extraneous aid; and, besides, it often happens that, at the time the membranes are ruptured, the head descends into the excavation along with the discharged waters. But on the other hand, as in the instance of the author just quoted, the deviation of the foetus, and of its presenting part, goes on increasing, and then it may require the version.

3. *Lateral Obliquities.*—For the reasons formerly given (page 82), the right lateral obliquity is far more frequent than the left; indeed, but very few examples of the latter are ever met with. These variations in the direction of the uterus are rarely of such a nature as to constitute a serious obstacle to parturition; they act more particularly in modifying, and sometimes even in altogether changing, the presenting part of the foetus. Let us suppose, for instance, says Dugès, that the womb be oblique enough to carry the child's head towards the border of one of the iliac fossæ, as I have seen in two cases; but it can hardly remain at this point, for it will either be pressed back into the excavation, or else it will slip further forward and outward, and the child, by thus becoming more and more oblique, will ultimately present one or the other shoulder at the superior strait.

Treatment of Uterine Obliquity.—In a large majority of cases, the obliquity of the womb, whatever may be its variety, presents no special indication for treatment; it constitutes a source of delay in the progress of the parturition, but it scarcely ever becomes a serious cause of dystocia. Consequently in these, as in all other slow labours, the first duty of the practitioner is to *wait*. In some very rare instances, where it happens that an excessive degree of obliquity is not rectified under the influence of the powers of nature, the intervention of art becomes necessary; and the indications then presented are—to restore the womb to its normal position, to sustain it there, and to remedy any symptoms that may arise.

The measures whereby the first two indications may be fulfilled, are perfect rest on the back, when the obliquity is anterior, or on the side opposite to the one occupied by the fundus uteri, when it is lateral, and the employment of the hands to support and maintain the deviated organ, or of a large bandage properly applied to produce the same effect; and the patient should be advised not to bear down until after the displacement is remedied. If these means are not sufficient, it will be necessary, while thus operating externally on the body, to act at the same time on the neck; for that purpose introducing two fingers into the uterine orifice, and taking advantage of an interval between the pains, to draw it gently towards the centre of the pelvis, whilst the other hand is employed in pressing the fundus of the organ in the opposite direction.

These measures generally succeed, and their use should be continued as long as the double interest of the mother and child will permit; but if they prove unsuccessful, and the reduction of the obliquity and the accouchement become impossible, our only resource

is to open an artificial passage, by making an incision into that portion of the uterine wall which projects into the vagina (the vaginal Cæsarean operation). Though this ought to be considered an ultimate resource, and one not to be resorted to until after the impossibility of introducing the hand into the uterus to effect the pelvic version has been fully ascertained.

In the posterior obliquity, the woman ought to remain seated or standing, or, if possible, even inclining a little forward. If the head forms a projection above and in front of the pubis, as in the case of Velpeau, and those reported by Dugès, the hand should support the hypogastrium, particularly; and, by perseverance, it will succeed in pressing back the head to the centre of the excavation. This manœuvre will be rendered more easy by the vertical position, by walking, or, if necessary, by the woman's resting on her hands and knees, so that the fundus of the womb will hang forward, as it were. A kind of see-saw movement then takes place, which, by depressing the part of the child that occupies the fundus, elevates that near the neck. Finally, should all these plans fail, the pelvic version must be resorted to.

§ 2. OF HERNIA OF THE WOMB.

Most of the cases of hernia of the womb may be referred to what we have described under the name of the anterior obliquities of this organ, for these are true *eventrations* ;* and it is exceedingly rare for the uterus, by escaping through one of the natural openings of the abdomen, such as the inguinal or the crural rings, to constitute a hernia, properly so called. Some well-established examples of it, however, are found in the books; for instance, Simon, in his Memoir on the Cæsarean operation, and Sabatier, in his work on the displacements of the womb and vagina, both of which are found in the valuable collection of the Academie de Chirurgie, have related several very curious instances of the kind.

In most cases, the displacement of the womb had existed prior to the fecundation, and the organ being thus placed without the abdominal circuit, continued to be developed there until full term. In some others (which are more difficult to admit), this organ having attained a certain degree of development, may have gradually dilated one of the crural or inguinal rings, and constituted a hernia on the exterior. These latter have been admitted by Desormeaux, but they are rejected by M. Moreau, who considers them as genuine *eventrations*, and we are disposed to adopt the latter view, at least so far as regards the case reported by Ruysch. Again, the existence of an old hernia has occasionally seemed to favor the development of a hernia of the uterus.†

* A term applied to the hernias following any accidental opening in the abdominal walls; as also to the falling of the belly, resulting from an extreme relaxation of the anterior ventral walls.—*Translator.*

† One Ramus, aged twenty-four years, and having borne six children, had a right inguinal enterocele, which had appeared some time before her marriage. At the third month of a seventh pregnancy she was attacked by an annoying,

The characters of this latter, during the gestation and labour, are too well marked to require a detailed account of the signs of recognition. But, at the time of the parturition, the inefficiency of the efforts of nature should be fully tested by a prolonged delay, before resorting to the Cæsarean operation, which is the only resource recommended by very many accoucheurs; for, in some cases, the travail has been known to terminate spontaneously.

§ 3. OF PROLAPSUS UTERI.

It is possible for a prolapsus of the womb to exist in a non-pregnant woman, and yet the latter may conceive, as is fully proved by the following observation of Marrigues, reported by Chopart. "A female who was affected with a prolapsus, had been impregnated by the direct and immediate introduction of the fecundating principle into the uterus, through its gradually dilated orifice." The conception having once taken place, the uterus may go on developing until term, and at the time of labour may present an enormous tumor hanging between the thighs; or this falling may only occur during the gestation; and again it may suddenly come on in the course of the parturition, where the patient is abandoned to herself, or is attended by inexperienced persons, who allow her to remain standing or walking for a long time, or who permit her to make strong bearing-down efforts, with a view of hastening her delivery, before the os uteri is sufficiently dilated.*

The prolapsus may prove a source of serious difficulty in the progress of the parturition, for experience has shown that this accident may not only be productive of long delays, but likewise of real dan-

dragging sensation on the left side of the hypogastrium. The tumor hitherto observed in the latter region disappeared, and she discharged blood by the vagina. By placing her hand over the inguinal hernia, she discovered there a hard, and strange body, that was painful on pressure, and which she several times attempted to push back again, without success. Seven weeks afterwards she felt some movements at that point, and sent for a physician, who detected at the lower and right portion of the abdomen a tumor, that descended on the thigh of this side, covering the pubis, and even going across as far as the left thigh; this tumor was twenty-six inches in circumference at the middle, and twenty-four inches at its junction with the abdomen. Several attempts at reduction were made without effect. The pains came on at the eighth month, and hysterotomy was then performed, but the reduction was still impossible after the delivery, and the uterus was left on the exterior. Both the mother and child were saved. (*Ledisma de Salamanca; Gaz. de Méd.*, 715, 1840.)

* According to M. Moreau, the patients are particularly exposed to this kind of displacement in the five or six weeks following the delivery. The uterus, which has been distended by the product of conception, still infiltrated by fluids, hypertrophied in a measure, has a much larger size and a far more considerable weight than usual; the ligaments that were stretched have regained as yet neither their consistence nor habitual strength. Now if, on the one hand, there is more weight in the organ to be sustained, and, on the other, greater debility in the ligaments which should sustain it, it is very apparent that a cause which, in the ordinary conditions of life, would be insufficient to bring about a displacement, will produce it under the circumstances just indicated. For these reasons, therefore, we cannot too strongly urge the patients to keep in the horizontal position during the early part of their lying-in, and to avoid all kinds of violent exertions for the first six weeks following their delivery.

ger; perhaps, it may even render the spontaneous expulsion of the foetus altogether impossible, either (as has long since been remarked) because the womb, which has descended to the lowest part of the abdomen, and possibly even beyond the ventral circuit, is removed as it were from the influence of the contractions of the abdominal muscles; or because, being wedged in between the surface of the child's trunk and the walls of the pelvis, it has lost a great part of its energy in consequence of this long-continued pressure.

The difficulties to be overcome will also vary according to whether the prolapsus be recent or of long standing; for, in the latter case, the prolonged contact of the organ with the internal face of the thighs, and with the dress, may have produced a state of induration in the cervix which opposes its ready dilatation; indeed, this has often been impossible, and the physician has been obliged to incise it to overcome the resistance offered by the indurated parts. On the contrary, where the accident has recently occurred, or still better, if it is only manifested during the labour, the dilatation of the os uteri is sometimes effected spontaneously; and the duty of the accoucheur is then limited to facilitating it by the use of the appropriate means.

The special indications presented by a falling of the womb, when occurring during gestation, are, to endeavor to reduce the displaced organ to its natural position, and to maintain it there after the reduction. These attempts should be made with the greatest possible care, lest the irritation necessarily resulting therefrom bring on an abortion; and where they have proved ineffectual, and all has been done that prudence warrants, we must desist, and confine ourselves to directing the proper attentions to the woman, and to sustaining the organ by the aid of some suspensory bandage. Of course, this reduction will be the more difficult as the pregnancy is the more advanced.

All tentatives at reduction would be dangerous during the travail; and consequently the accoucheur must then be satisfied with hastening the dilatation of the os uteri as much as possible, and with preventing the lacerations it would become the seat of by suitable incisions, in cases of induration.

The delivery of the placenta likewise demands much circumspection, since it is evident that we cannot trust its expulsion to nature, and still less can we draw on the cord in the usual manner; hence, the after-birth must be artificially separated. Immediately after its delivery the uterus retracts, and then the reduction of this organ is often quite easy.

CHAPTER V.

OF THE OBSTACLES DEPENDENT ON THE FœTUS OR ITS APPENDAGES.

IN order for the accouchement to be effected spontaneously and without danger, it is not only necessary that the mother be well-formed, and the labour not complicated by any of the accidents that we shall hereafter have occasion to study, but also that the conformation of the fœtus, and the size of its different parts, do not destroy the just relations that should exist between it and the canal it has to traverse. It is further requisite that the child present by one extremity of its long axis; for, with the exception of a few rare cases, a natural delivery is only possible where it presents by its cephalic or its pelvic extremity. But, unfortunately, these favorable conditions are not always met with; for the fœtus may be affected by various diseases at the time of its birth, or may have some vice of conformation, which sensibly augments its dimensions; and it may likewise be mal-placed, relatively to the canal it has to pass through. Therefore, we must successively consider the indications presented by these diseases, deformities, and vicious positions.

ARTICLE I.

DISEASES OF THE FœTUS.

The diseases of the child, that are to be mentioned in this connection, are those which, by sensibly augmenting the size of one of its parts, create an obstacle to its passage through the pelvic canal. We have, therefore, to treat of hydrocephalus, hydrothorax, ascites, and the accidental tumors that may have been developed on the various portions of its body, during the intra-uterine life.

§ 1. HYDROCEPHALUS.

Under this term are included all the dropsies of the head, and all the effusions or infiltrations of serosity on the interior or exterior of the cranial vault.

Hydrocephalus has been described by the authors as external or internal, according to the seat of the effusion; placing under the former variety all the serous or sero-sanguinolent infiltrations that are found under the hairy scalp or pericranium. This latter affection has never hitherto been considerable enough to constitute an insurmountable obstacle to parturition. In fact, it is usually asso-

ciated with a state of general œdema that destroys the fœtus at an earlier period of gestation; and, consequently, its expulsion is effected without difficulty, whatever may be the thickness of the scalp. I saw a seven-months' child, at *la Clinique*, in 1838, in whom this part was a finger's breadth in thickness, and the mother, also, was quite œdematos; but the labour terminated without difficulty. Desormeaux speaks of two very similar cases.

Hydrocephalus internus, the only variety requiring a particular description, is such a rare disease, that Madame Lachapelle observed but fifteen cases of it in forty-three thousand five hundred and fifty-five labours.

In the estimation of pathologists, this is always a grave affection, on account of the danger to which it exposes the child after birth; but more particularly so, in the eyes of the accoucheur, from the difficulties thereby entailed on the travail itself. Moreover, these delays and dangers vary with the quantity of liquid effused into the cranium; because, where this is inconsiderable, the delivery is still possible, owing to the flexibility and the softness of the head, the walls of which are nearly all membranous; so that, by gradually moulding itself to the passage, the head becomes lengthened out, and the labour is either terminated by the powers of nature alone, or else is effected without much difficulty by the application of the forceps, or by the pelvic version; but where the water exists in greater abundance, the head's dimensions exceed those of the diameters of the basin* so much that the delivery is absolutely impossible, unless the fluids be evacuated by an artificial puncture, or by a spontaneous rupture of the sutures, or fontanelles.

The following, according to Dugès, are the signs whereby a dropsy of the head may be recognized during the parturition: the finger, when entered, falls upon a large and slightly convex surface, which occupies every part of the superior strait without engaging, and has a variable consistence at different points; for, although hard and resistant while the pain lasts, it is, on the contrary, soft and fluctuating in some places during the interval between the contractions. Then, by passing the index regularly over it, the accoucheur can recognize pieces of bone separated by membranous inter-spaces, or soft commissures, as broad as the finger; and, at times, the fontanelles equal the hollow of the hand in extent. If the child has presented by some other part than the vertex, and the head is only accessible to the touch by its base, the separation of the bones detected by the finger will be much less, though it is always appreciable. Finally, if the dropsy be inconsiderable, the same characters will be observed (though they are less evident); and, besides, the

* In a case reported by Wrisberg, the child's head was ten and a half inches long, and thirty-two inches in circumference. Meckel has the skull of a hydrocephalic infant, whose transverse diameter is sixteen and a half inches, and its height, taken from the occipital foramen to the vertex, measures sixteen inches; and Burns gives a case of hydrocephalus, where the circumference of the head amounted to twenty-three inches.

head being then more convex, and not so soft, will engage better in the pelvic excavation.

The indications for treatment presented by this affection vary with its extent, and according to whether the child is living or dead. Besides which, as Dugès justly remarks, the physician must not only base his determination on the size of the head, but also on its flexibility and its inclination to engage in the excavation.

When the cranium is of a moderate size, is soft, reducible, and, from the influence of the strong, energetic contractions of the womb, gradually approaches the inferior strait, we should temporize, and be satisfied with favoring a spontaneous termination of the labour by the employment of the proper means. But if the accouchement is delayed, and the pains are weakened or uselessly spent against insurmountable difficulties, the forceps should be at once applied. Nevertheless, the pressure and tractions on the head ought to be slow and gradual, with the view of preventing a rupture, which can always be avoided by proceeding with gentleness, and under a fear of the instrument's slipping.

The pelvic version would doubtless be resorted to, in presentations of the trunk; but if the operator has been fortunate enough to detect the large size of the head before searching after the feet, he should, in my opinion, endeavor to bring the cephalic extremity to the superior strait.

Where the head's size is such that a spontaneous delivery is wholly impossible, and the application of the forceps, or the pelvic version is not practicable, there is no other resource for saving the mother than to puncture the cranial vault, which alone can afford an outlet to the serum accumulated in its cavity. This operation may be performed with the trocar, the bistoury, or with any pointed knife whatever, after having taken the precaution to envelop its blade with tape, so as only to leave the point uncovered. This simple puncture of the membranous intervals is always preferable to the mutilation of the child. For, although the sudden sinking in of the brain, which usually follows the evacuation of the liquid nearly always occasions the death of the foetus, still the latter may possibly survive such an operation; since a puncture of this kind made after birth has occasionally been followed by a complete cure. Smellie's and Stein's scissors should, therefore, be proscribed in these cases, and we ought only to decide on plunging them into an intact brain, when the opening made with a smaller instrument has not been free enough to permit the escape of the liquid. In no case is a bloody operation on the female permissible, because the life of the infant is then too seriously compromised, by the mere fact of hydrocephalus, to think of sparing it at the expense of that of the mother.

Where the child is dead, cephalotomy would appear to us preferable, unless some serious difficulties in its performance were likely to be met with.

§ 2. HYDROTHORAX AND ASCITES.

An ascitic dropsy is even more rare than hydrocephalus, though

it is met with somewhat oftener than hydrothorax. The signs indicative of a dropsy of the chest are a considerable enlargement of the thorax, a widening of the intercostal spaces, and an evident fluctuation in these enlarged intervals. On the contrary, the extraordinary size of the belly, the distension of its walls, and the fluctuation detected there, characterize ascites. The foetus, being retained by the amplitude of one or the other of these cavities, is arrested in its progress through the pelvis, and the accoucheur finds the excavation filled up by a large, soft, and fluctuating tumor. In some cases of extreme distension of the abdomen, the walls of this cavity have been found to yield, so that a great part of the tumor remained above the superior strait, whilst the rest of the trunk gradually descended into the excavation; and when one portion of the abdomen had reached the exterior, the liquid gravitated towards this point, where the resistance was less, the portion remaining internally progressively diminished in volume, and the accouchement terminated naturally. Frank speaks of a hydropic infant that presented by the breech, in whom a quantity of the serum had escaped from the abdomen into the scrotum; and an evacuation of all the liquid was secured by making an incision into this part, which course should be repeated, if a similar case were to occur. But when the aqueous tumor of the chest or abdomen is large enough to be arrested by one of the straits, we should have recourse to a puncture with the trocar.

Merriman has remarked that, when the foetus has been dead for some time, a large quantity of gas may be created in consequence of the putrefaction it has undergone; thereby greatly augmenting the volume and the distension of the belly, and consequently retarding the expulsion. "I have known," says he, "two instances of rupture of the vagina, arising from the rashness of midwives, who forcibly dragged the children, enormously swelled with putrid air, into the world. In one case, the vagina was split completely through. Both the women died in a few hours. Had the bellies of the children been punctured, to give vent to the air, these fatal occurrences would have been avoided." (*Synopsis.*)

§ 3. TUMORS OF THE FÆTUS.

The tumors, of divers sorts, which the foetus may have at the time of birth, the volume of which is occasionally considerable enough to impede its spontaneous expulsion, are not susceptible of being included under any general head, and the measures to be employed vary for each. Where they are pediculated, it not unfrequently happens that the pedicle is broken, either by the influence of the expulsive efforts of the womb, or the tractions made by the accoucheur. When their induration is not very great, they temporarily disappear, at times, from being compressed between the foetal surface and the uterine parietes, or the osseous walls of the pelvis. The proper course is to remove them, when accessible, or to discharge their contents by means of a puncture where they contain a liquid.

But, unfortunately, we can seldom even suspect their existence until the labour is already so far advanced that it is hardly possible to act; and hence, if their volume be excessive, the child's death will nearly always result from the delay and difficulty in the parturition, and then the conduct to be followed is clearly evident.

§ 4. ANCHYLOSIS OF THE FÆTAL ARTICULATIONS.

Dr. Busch has recently had an opportunity of observing a very singular case of dystocia, dependent on an ankylosis in the articulations of the child's limbs, in which the forceps was applied, but, after the extraction of the head, the trunk could not be delivered. Being unable to discover the cause of the difficulty, repeated tractions on this part were made, which were at first moderate, but afterwards more powerful, when an unexpected cracking noise was heard, and the upper part of the trunk cleared the external orifice; but the lower portion of it likewise became arrested, and, as the child was dead, it was dragged out without hesitation, and the same cracking sound was again heard. At the autopsical examination, it appeared that the articulations of the limbs had been ankylosed in the ordinary flexed position, exhibited by the fœtus in the womb, and that the bones of the arms and thighs were fractured. (*British and Foreign Med. Review*, p. 579, April, 1838.)

ARTICLE II.

DEFORMITIES OF THE FŒTUS.

Under this title we shall include the fœtuses of an extraordinary size, those presenting the vices of conformation known as the acephalous or anencephalous fœtuses, etc., and twins connected together by one or more points of the surface of their bodies; and we shall conclude the article with the special indications presented by twin labours.

§ 1. OF EXCESS OF VOLUME.

However voluminous we may suppose a child to be at the time of birth, it is impossible to believe that its volume alone can constitute an insurmountable obstacle to a spontaneous delivery, without supposing a simultaneous retraction of the pelvis; since the largest children are never more than twenty-three inches from the vertex to the heel: and, as Dugès remarks, if the head presents in its state of habitual flexion, the sub-occipito-bregmatic diameter, which corresponds to the oblique one of the superior strait, is but four and a quarter inches at the most, that is, half an inch less than the oblique diameter.

Nevertheless, for this to occur, it is necessary that the head's flexion be carried to the extreme; for, otherwise, the occipito-frontal diameter, which has occasionally amounted to five and a quarter inches, in very large children, would come into relation with the

oblique diameter of the pelvis. But, fortunately, this demi-flexion will always be completed in the vertex presentations by the force of the uterine contractions; and the same will be true in the spontaneous expulsion by the breech, unless some ill-directed tractions unfavorably complicate the efforts of the womb. Therefore it will only be in those cases where a presentation of the trunk will have rendered the pelvic version imperative, that an unusual development of the foetus can render its extraction difficult. Consequently, in all these cases, the precautions to draw on the infant only while the pain lasts, to turn the child's anterior surface towards the sacrum, and to avoid the crossing of its arms behind the neck, should be redoubled. (*Vide Version.*) Besides, if the spontaneous expulsion of the head be difficult, we should resort to an application of the forceps, the same as if it were an original presentation either of the cephalic or of the pelvic extremity.

§ 2. OF MONSTROSITIES.

As the cyclopes, the anopses, the acephalous and the anencephalous fœtuses, are delivered as easily as those having a normal conformation, we need not dilate upon them here.

§ 3. OF MULTIPLE AND ADHERENT FÆTUSES.

We pointed out the signs, in the article on gestation, by which the presence of two or more children in the uterine cavity might be recognized, during pregnancy; but these characters equally belong to separate and distinct twins, and can in nowise aid in ascertaining the adherence, or the more or less intimate fusion, of two living beings into each other. The diagnosis is likewise very difficult at the period of labour, for, even after the twin pregnancy has been recognized, it is only by negative evidence that we can suspect the adhesion of the two children. Thus, for instance, if two bags of waters are detected by the finger, if it is necessary to rupture the membranes twice, if the amniotic waters are discharged at two separate and distinct periods, the presence of independent twins in the womb may be regarded as certain; for there are never two envelops for a double monster, and two perfect twins are very seldom shut up in the same amniotic pouch. Again, if two feet or even a single one descend with the head, more particularly if the feet yield to the tractions made on them, and appear at the vulva without the head's having a tendency to reascend, we may affirm there are two infants, because a monster is never composed of two individuals held together in such a way that the head of the one is alongside of the feet of the other; but if several limbs present simultaneously, we can only ascertain whether the children to which they respectively belong are joined together or are independent, by carrying the hand up into the womb. (Dugès, *Mém. de l'Academie.*)

Is it proper to interfere in all cases, whether the monstrosity be recognized or not, or should the accouchement be abandoned to nature for a certain length of time? The recorded instances, which

prove that a spontaneous labour may take place, are too numerous at the present day to warrant an active intervention until after a sufficient length of time has been accorded to the uterine contractions to effect the expulsion. The mechanism by which the delivery is finally accomplished will also vary according to the particular kind of monstrosity. Thus, when the two foetuses are united by the breech or head, their expulsion takes place without any marked difficulty, and they generally escape one after the other, more particularly when they happen to be joined at the breech. But if connected at the occiput, the point of union is seldom flexible enough to permit the two heads to descend simultaneously, and if the patient is at her full term the intervention of art will become necessary. Where there are two heads for a single trunk, the mechanism varies according to whether the monstrosity presents by the vertex or by the breech; but the accouchement is still possible, if the twins are slightly adherent and movable enough not to be invariably parallel, so that the two heads may engage successively and not simultaneously. In the vertex presentations, the anterior head, which is the most inferior on account of the obliquity of the child's trunk, that is placed in the line of the axis of the superior strait, engages first; and then the other, that had been primitively arrested by the sacro-vertebral angle, follows it. On the contrary, where the infant is delivered by the breech, the posterior head will engage the first, in consequence of the inclination impressed on the trunk by the axis of the pelvic canal; and the anterior one, that was hitherto delayed by the symphysis pubis, will engage immediately afterward.

When each head has its own body, but the two trunks are united by their lateral, anterior, or posterior faces, whether throughout their whole extent, or only in a partial degree, a spontaneous accouchement is more difficult than in the former cases; but, when it does occur, it takes place just in the same way. If there is only one head for two bodies, the latter are expelled simultaneously, and the only difficulties that can then present, depend on the unusual size of the head, which is sometimes very large.

The process does not always advance as favorably as we have just stated, since it is not at all unusual for one of the heads (where the double condition involves the whole body, or is limited to the head) to be arrested above either the sacro-vertebral angle or the symphysis pubis, and thus delay the subsequent descent of the one that is already engaged, or on the point of engaging.

What has just been stated concerning the mechanism by which the expulsion of the bi-cephalous foetuses is effected, would naturally lead us to suppose that, whenever one of the heads shall have been arrested above the superior strait, the pelvic version should be resorted to, if the monstrosity presents by its cephalic extremity or trunk; and if the breech descends first to draw on the lower extremities. But, in either case, when the greater portion of the body is delivered, it would be necessary to carry up the trunk in front of the symphysis pubis, so as to favor the engagement of the posterior

head, prior to the anterior one. Again, if the head that presents first shall have been engaged too long in the pelvic excavation to admit of being pressed back, and of the feet being brought down, it would be proper to make an application of the forceps, if the fœtus were still living; but, under such circumstances, this latter measure will often prove ineffectual, for the tractions made by the instrument will not overcome the resistances offered by the second head; and then we have only to choose between a bloody operation on the mother, and a division of the child's neck, which would permit the head that offered first to be removed, and thus render the pelvic version practicable. And here, notwithstanding the high authorities to the contrary, I do not hesitate to advocate the mutilation of the fœtus; for, in cases of this nature, I would have no scruple in sacrificing the infant's life to the safety of the mother.

§ 4. OF MULTIPLE AND INDEPENDENT FÆTUSES.

Although the expulsion of the child often takes place in twin pregnancies with as much facility or sometimes even with greater rapidity than in ordinary labours, yet it must not be supposed that the whole duration of the travail is always shorter; for very often, on the contrary, the parturition will be found to drag along, and become tedious. Indeed, by reflecting on the circumstances which then complicate the process, it will not be a difficult matter to explain this unusual delay, since it is well known that an excessive distension of the womb greatly diminishes both the force and frequency of its contractions; and, as the labour often comes on before the end of the ninth month, the cervix uteri has not yet undergone those modifications which usually render its dilatation at term quite easy; besides which, the elevation of the presenting part, whose engagement is impeded by the presence of the second fœtus, also contributes to retarding this dilatation. The stage of expulsion, which the small size of the twins would at first sight seem to facilitate, is often delayed by the feebleness of the contractions, and also by the disorder and considerable loss of force occasioned by the presence of an ovum, that still remains intact within the cavity of the womb; and such is the unfavorable influence of this latter circumstance, that it is only through the thickness of the second ovum, that the contraction of the greater part of the uterine fibres can possibly reach the body of the child that first presented at the upper strait. But when the first infant presents by the pelvic extremity, the escape of the head is particularly apt to be attended with difficulties; for, if the perineum be resistant, even in a slight degree, as in the primiparæ, for example, the intervention of art will nearly always be indispensable, because the uterus can have no further influence on the head of the first, from being wholly occupied by the other ovum.

The following table, which gives the presentation of both children, in three hundred and twenty-nine cases of twin pregnancy, will serve, as a matter of curiosity, to show the relative frequency of the positions.

IN 329 TWIN PREGNANCIES, THE TWO CHILDREN PRESENTED AS FOLLOWS:—			
Both by the head. 134 times.	The 1st by the head; the 2d by the breech. 55 times.	Both by the breech. 12 times.	The 1st by the breech; the 2d by the head. 31 times.
The 1st by the breech; the 2d by one foot. 11 times.	Both by the feet. 8 times.	The 1st by the feet; the 2d by the head. 29 times.	The 1st by the breech; the 2d by the elbow. 1 time.
The 1st by the head; the 2d by the shoulder. 7 times.	The 1st by the face; the 2d by the head. 1 time.	The 1st by the feet; the 2d by one hand. 1 time.	The 1st by the feet; the 2d by the breech. 1 time.

Nearly always the twins present one after the other at the superior strait, and the expulsion of the first is promptly followed by the birth of the second; and the same is true of the others when there are more than two. But it occasionally happens that the progress of the travail is not effected so regularly, and then the children may be born at a considerable interval from each other, and their expulsion may be rendered difficult by the attendant delays and dangers. It most generally happens that the womb, being fatigued by the efforts necessary for the expulsion of the first born, retracts a little after this partial depletion, and remains in a state of rest for some minutes, in consequence of having lost a part of its contractile properties; still retaining, however, a greater volume than usual. For, by placing the hand on the anterior abdominal region, the accoucheur will be able to verify the abnormal size of the organ, and to detect, through this wall, the inequalities appertaining to the foetus; and, besides, another amniotic pouch, or the presenting part of a second child, can readily be detected at the upper part of the uterine neck by the vaginal touch. In general, the repose of the womb is but momentary, and in about a quarter of an hour, sometimes at the end of five or ten minutes, though rarely later than twenty or thirty minutes, the patient feels the pains coming on again, at first feeble and slow, but soon becoming stronger and more energetic; when the precaution is to be taken to rupture the membranes, if this had not already occurred, and then to abandon the rest of the labour to the powers of nature. This second delivery is soon over, as a general rule, when the foetus presents in a natural position, for the parts have been so enlarged by the passage of the first child, that they offer but little resistance to the escape of the second. But, in some cases, the pains which have been suspended after the birth of one of the twins, do not reappear for some hours, and sometimes even not for several days.*

* Four women, registered in the Dublin hospital, were delayed ten hours in the delivery of their second child. The reader will also find, in the *Medical and Physical Journal* (April, 1811), the details of a case in which the second child was not born until fourteen days after the first; and the author of that communication states, that another case had come to his knowledge, in which six weeks had elapsed between the birth of the twins. A woman was delivered on the 4th of March, 1814, of two children; she found herself so well on the second day that she rose to attend to her affairs, but, on the sixth, she was again delivered of two more. (*Gentleman's Magazine*, 1814.)

Now, what is to be done in cases of this kind? Is the labour to be abandoned wholly to nature, or should we attempt to bring on a prompt delivery? In some instances, there can be no hesitation as to the proper course; thus, for example, when the birth of the first child has been tedious and difficult, and has required the intervention of art, and the forces of the patient seem to be exhausted by the former effort; when any accident whatever, that threatens the life of the mother, or of the second twin, has occurred during or after the delivery of the first; and, whenever the second one presents in such an unfavorable position* at the superior strait as to demand the pelvic version, this ought to be performed immediately. But, in all these cases, the expulsion should by no means be rapid, and the accoucheur will draw very slowly on the pelvic extremity, so as not to empty the uterus too soon, and so as to avoid the inertia and attendant hemorrhage which might result in consequence of this rapid depletion. It would even be prudent, when the defective position shall have been converted, by the evolution, into a presentation of the pelvis, to trust the rest of the delivery to the expulsive efforts of the womb. The application of the forceps will rarely be necessary, because, if the head is so far engaged as to render the pelvic version impossible, the accouchement will probably terminate alone. Nevertheless, should the impuissance of the uterus be complicated with any accident, serious enough to compromise the life of the mother or child, it would be proper to have recourse to this instrument if the head had arrived at the inferior strait; but in all other cases the pelvic version ought to be preferred, because the introduction of the hand and the evolution of the foetus will not fail, by the irritation they produce, to determine the retraction of the uterine walls, and thus prevent their consecutive inertia.

"When the two children present well, and the expulsion of the first is effected naturally and without great fatigue to the woman, I wait," says Merriman, "until the pains of the second childbirth come on; ordinarily, this happens shortly after the escape of the first born; if efficacious pains do not occur in the course of a quarter or half an hour, I provoke the contraction by rubbing the abdominal tumor gently with the hand, and by titillating the os uteri with the finger; if these irritations, made simultaneously on the body and neck, are inefficacious, and several hours elapse without the womb's contracting, I deem it advisable to excite the contractions by rupturing the membranes, after having previously administered the ergot. This mode of acting is based on the two following reasons; where we have delayed too long a time, the pains have always appeared to me more severe than they would have been if the action of the uterus had been solicited sooner; and the expulsion of the second child has commonly seemed to me more easy through the parts that had recently been dilated by the first delivery."

* It is not very unusual to find the second child presenting by the shoulder; which is probably owing to the existence of the vacuum in the womb after the expulsion of the first one, a void that singularly facilitates the displacement of the second.

Further, in all such cases, our rules of conduct should rather be based on the condition of the womb itself, than on the length of time that may have elapsed since the birth of the first child; because it must be evident that a relaxation and an inertia of this organ would forbid all attempts at extraction, and that we should never endeavor to deliver the second child before having excited the organic contractility of the uterus, by all the available means. If, by chance, these measures prove inadequate, it will be better to wait several hours, or, if necessary, even for several days, rather than expose her to the terrible consequences resulting from inertia.

Where one of the twins, though dead, has remained in the uterus for several months, whilst the development of the other was constantly progressing, the little abortion is ordinarily expelled simultaneously with, or shortly after, the first child; but, unless the accoucheur is very careful, and the size of the womb after the delivery should not excite his attention, its sojourn there may be considerably prolonged. (*Vide page 142.*) No doubt, in these cases, the hand ought to be carried up into the womb, for the purpose of delivering the aborted foetus, but this will not always prove an easy matter. In a case of the kind, communicated to me by Dr. Casaubon, the internal uterine orifice became strongly retracted immediately after the extraction of the placenta, and it was not without great difficulty that he eventually succeeded in overcoming its resistance, and reaching the uterine cavity. The little product was then removed, and it proved to be an abortion of four months. The other infant had arrived at the end of the eighth month.

In certain cases, the presence of two children may render the accouchement difficult, and may require some particular precautions; as, for instance, it may happen: 1. That both present simultaneously at the strait, and thus retard each other's expulsion; when the most movable head should be carefully pushed up, so as to permit the other to engage first. The difficulty will be greatly enhanced, if the two heads be engaged in the excavation at the same time, and neither of them can be pressed back; under such circumstances, the application of the forceps upon the one that appears the most engaged, and, if this does not succeed, the perforation of one of them, seem to me the only practicable operations. However, even here, very prompt action is unnecessary, for it might happen, if both children were small, that a natural expulsion could be effected; an example of which is reported by Allan, in vol. xii. of the *Medico-Chirurgical Transactions*. The same plan is to be pursued when, instead of the heads, the breech or the feet of the two infants present together.

2. That the first child may present by the shoulder; here, the pelvic version is evidently indicated, but, in performing it, the operator must be very careful to seize the feet of the right child, before commencing the evolution, for, if both the bags of waters were ruptured, nothing would be more easy than to get hold of two feet belonging to different children.

3. Where the first presents by the feet, whether spontaneously, or as a consequence of the pelvic version, the greater part of the

trunk is extracted without difficulty, but the head may be arrested in the excavation, or above the superior strait. Thus, in the twentieth observation of the fourth Memoir of Madame Lachapelle, the head of the first born had drawn under it that of its brother, which had a tendency to present by the vertex, so that the latter one blocked up the passage of the former, while the first prevented the second from getting above the superior strait; but, fortunately, the children were small, and the head of the second twin escaped spontaneously, alongside of the neck of the first, and then the head of the first followed with the neck of the second. A very similar case, given by Dr. Erwin, is related by Dr. Dewees. Had these two fœtuses been of the ordinary size, it is clearly evident that their expulsion could not have been effected until one or possibly both heads had been reduced by craniotomy. The mutilation of one child seems to me the only resource we can recur to in these difficult cases; thus, it has properly been recommended to amputate the neck of the first twin, which would render the expulsion of the second one spontaneous, or at least would permit its extraction by the forceps; after which, the head of the mutilated infant should be sought after and be brought down. However, before resorting to this cruel operation, an application of the forceps ought to be attempted on the head that first descended, as appears to have been successfully done by a surgeon of Dijon. In fact, from the smallness of the children, it is possible that, in many cases, the second head will afford but a feeble obstacle to the passage of the trunk of the child we are endeavoring to extract by the instrument.

4. Again, two feet occasionally present at the orifice; when, if the accoucheur deem it advisable to aid the expulsive efforts of the womb by tractions, he might, by supposing they belonged to one child, draw on both, and thus engage parts of both twins at the same time, which, of course, cannot pass out together; therefore, if there is the least doubt of the character of the pregnancy, he should ascertain, before making any tractive efforts whatever, that the two limbs really belong to the same individual, which is done by passing the hand up into the womb as far as the hips; though it must be confessed that this diagnosis is frequently attended with great difficulty.

Pleissman states that, on one occasion, he found the orifice plugged up by the parts that had become engaged, and which at first sight appeared to him to be *a quantity* of hands and feet. A more careful examination enabled him to distinguish four inferior extremities, which were delivered as far as the ham, and one arm. "At first," he says, "I was in great perplexity, because I could find no way of introducing my hand into the womb, for the purpose of distinguishing and seizing the two feet belonging to each child, and because all my efforts to make even one of these extremities go back again proved abortive; besides which, in drawing on any two of them, I might confound and bring down the feet of two different fœtuses at the same time; and, lastly, even if I succeeded in seizing the two feet belonging to the same infant, I might, by draw-

ing on them, engage the other parts, and thus augment the difficulties. Being greatly embarrassed as to the proper course, and yet obliged to act, the employment of a measure recommended by Hippocrates, under different circumstances, happily suggested itself; that was, to suspend the patient by her feet, hoping that the heads and the trunks of the children would, by their weight, draw one or more of the extremities towards the fundus of the womb, which was still distended by the waters. The husband and brother-in-law of the woman passed their arms under her hams, and thus held her suspended, so that only the head and shoulders rested on the bolster. I intended, as soon as I mounted on the bed, to press back one or more of the free extremities into the womb, but two had already returned from the mere position of the mother, and the other three soon followed by the aid of my fingers. Immediately afterwards, I was enabled to introduce my hand into the uterus, and to withdraw successively therefrom three children by the feet."

In bringing forward this case, I only desire to illustrate what has been said concerning the difficulty of diagnosis. I ought also to allude to the impossibility of the reduction, and the singular procedure resorted to, with a success that seems to warrant its employment again under similar circumstances.

ARTICLE III.

PROLAPSUS, OR FALLING OF THE CORD.

The descent of the cord is quite an unusual accident, since Madame Lachapelle states that she met with it but forty-one times in fifteen thousand six hundred and fifty-two labours; but it is probable, as she appears to think herself, that there has been an error in the registers, for the statements given by other observers show a much larger proportion. I shall only bring forward the account of Michaelis, who says that he had detected fifty-four cases of falling of the cord in two thousand and four hundred accouchements; and a summary, by Dr. Churchill, of ninety thousand nine hundred and eighty-three labours, in which there were three hundred and twenty-two cases of prolapsus, or one in two hundred and eighty-two, nearly. (*Rigby.*)

The falling of the cord is most frequently observed in the vertex presentations, which circumstance is readily explained by the rarity of all the others. But, in proportion to the relative numbers, it is more frequent in breech presentations, and far more so in those of the trunk. For instance, though I have as yet encountered but fifteen of these latter presentations, I have found them twice complicated by the premature descent of the cord. In thirty-three cases of labour at term accompanied by this accident, Mauriceau observed seventeen presentations of the vertex, one of the face, one of the feet, nine of the hand or arm, three of one hand and one foot, one of the breech and one hand, and one of the head and one hand.

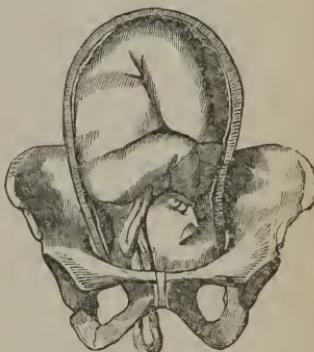
In sixteen thousand six hundred and fifty-two deliveries, Dr. Collins has met with ninety-seven cases of prolapsus: namely, twelve times in twin pregnancies (and in seven of these twelve the prolapsed cord belonged to the second child); nine times in footling presentations; twice in those of the breech; four times with the shoulder; seven times when an escape of the hand complicated a head presentation; seven with a dead and putrefied foetus; and, lastly, in three cases the accouchement took place before term; that is, twice at seven and once at eight months; and the others were simple vertex presentations.

Certain authors have endeavored to draw a line of distinction between the prolapsus and a presentation of the falling, properly so called; designating, under the latter denomination, those cases in which the cord, though found in the uterine orifice, is still retained in the amniotic sac, on whose lower part it lies; and, under the former, those cases only in which it hangs down in the vagina, or even protrudes beyond the vulva, after the rupture of the membranes; but such a distinction is puerile, as it can only serve to designate two degrees of the same accident.

A. The *causes* that may be considered as predisposing to a prolapsus are: the unusual length of the cord itself, a large quantity of the amniotic waters, the vices of conformation in the pelvis, an obliquity of the womb, and those malpositions of the child which impede the presenting part from engaging readily in the superior strait and excavation. The attachment of the placenta near the os uteri also predisposes to a prolapsus, by sustaining the cord just at the uterine orifice. With regard to the determining causes, we must place in the first rank a sudden rupture of the membranes, and the rapid escape of a large quantity of the waters, which generally sweep along with them a fold of the cord. Consequently, when the neck of the womb is almost effaced, the bag of waters very prominent, and the head not engaged in the excavation, we must carefully avoid rupturing the membranes during a pain, for the gush of liquid, which then escapes with considerable force, nearly always carries along a turn of the cord, which thus precedes the presenting part. (Martin of Lyons, *Comptes Rendus*, page 13.) To these causes, let us further add the descent of a hand or a foot, which seems to act as a guide, as it were, for the cord, and to open the way for it.

B. The *signs* whereby these accidents can be recognized vary, according to whether the membranes are ruptured or are still intact. In the latter case, the diagnosis is quite difficult; nevertheless, we can often detect something like a soft cord, through the portion of

Fig. 79.



The right posterior occipito-iliac position, complicated by a falling of the cord.

the membranes that covers the os uteri, of a diminutive size, and slipping away before the least pressure; but the true nature of which can only be determined by the rapid pulsations in it. The rapidity of these, which Madame Lachapelle aptly compares to the ticking of a watch, can alone enable us to distinguish them from some other pulsations produced by certain arterics that occasionally ramify in the substance of the neck, and which are synchronous with the mother's pulse. This error would be more difficult to avoid, should the finger, when applied on the membranes, encounter one of the arterial ramifications of the cord, which, as in the cases described by Benckiser (*vide page 197*), might ramify on the membranes before sinking into the proper tissue of the placenta. Hence, the size and the mobility of the prolapsed cord would also aid in making out the diagnosis. On the other hand, the thickness and the spongy condition of the membranes, the inequalities they occasionally offer, and the folds of the child's scalp might perhaps lead us to suspect a falling of the cord, if the clearly ascertained absence of pulsation did not promptly rectify the mistake. But after the rupture of the membranes all the difficulty disappears, for then the cord hangs down in the vagina, and often escapes beyond the vulva, and therefore may always be readily explored.

The two portions of the prolapsed fold are not uniform in their relations with each other; most generally, they touch or are simply approximated together; and sometimes they are separated by the whole thickness of the presenting part. Nor is the fold more regular in its length; at times it only embraces the head, holding it like a sling, while at others it appears externally between the woman's thighs, though most usually it is lodged in the vagina, or at least only reaches the exterior in the latter stages of the travail. It has, in some very rare instances, been known to go up again, and thus become reduced spontaneously. (Guillemot.) As a general rule, it is situated just in front of one of the sacro-iliae symphyses, or behind the ileo-pectineal eminence.

A prolapsus, therefore, can always be detected; but it is much more difficult though at the same time it is highly important to determine, after the exploration, whether the child is living or not. A momentary disappearance of the pulsations is not a sufficient sign; for it not unfrequently happens that the throbbing ceases in it during the pain, because the cord is then strongly compressed, but it reappears again as soon as the pain is over; and this want of circulation in the vessels of the cord may continue for five or ten minutes, and it has even been known to last for a quarter of an hour, without necessarily terminating in death. It is therefore during the interval alone that any researches of this nature should be made, and the child's death can only be determined with certainty when this exploration, repeated several times under like conditions, shall have always furnished a negative result. A cold, soft, withered, and greenish cord, doubtless belongs, in most cases, to a dead child, but this is not always true; and, on the other hand, as death may result

very promptly from a compression of the cord, the latter may still be warm and fresh, though the foetus be dead.

c. *Prognosis.*—The falling of the cord is only serious as regards the foetus; but to it the danger is imminent, since death itself may result in consequence in the course of a few minutes. Thus, for instance, in three hundred and fifty-five cases collected by Churchill, two hundred and twenty children, or nearly two-thirds, died: though it is worthy of remark that, in many of these cases, the mothers were not transported to the hospital until some time after the descent of the cord, and when its pulsations had entirely ceased.

The compression of the cord, and the consequent interruption of the foeto-placental circulation is the principal if not the only cause of death; though certain authors, among whom I can enumerate Velpau and Guillemot, suppose that, when the cord protrudes beyond the vulva, the blood may lose its fluidity in consequence of being chilled by the external temperature, perhaps may even coagulate; and that the delay in the circulation thereby produced, combining its influence with that of a slight pressure, completely interrupts the current which, up to that moment, had only been retarded; but Delamotte, Baudelocque, and Madame Lachapelle, do not admit this effect of the cold. "For I have seen," says this illustrious midwife, "the cord hang out of the vulva for several hours together without the foetus suffering therefrom in anywise, because there was no compression; and this, in some of the cases, notwithstanding the patients had come a greater or less distance, either on foot or in some vehicle, from their residences to our hospital."

But whatever view may be adopted, it is still to a compression of the cord that we must attribute the greatest share in the production of the child's death; and under this aspect, its position, when prolapsed, will greatly modify the prognosis. The points where it is least exposed to compression are just in front of the sacro-iliac symphyses; and, as M. Nægèle has justly remarked, the frequency of the vertex positions in which the occipito-frontal diameter corresponds to the left oblique one of the pelvis, renders the danger in general much less if the fold of the cord happens to be placed behind and to the left; while the most unfavorable points of all would be the anterior and the posterior regions of the basin.

The influence of this compression has been variously interpreted; according to some, the child will die from apoplexy in consequence of an excess of blood, which continues to arrive by the vein, but can no longer return to the placenta through the umbilical arteries; agreeably to others, the circulation will be free in the arteries, the vein alone being obliterated, and then the foetus will die from anemia or syncope. But it is only necessary to examine the intertwining exhibited by the vessels of the cord, to become convinced that this partial compression cannot exist except as an accidental circumstance, and that, as a general rule, the current must be interrupted in all three vessels at the same time. The most plausible opinion, and we believe the only one admissible, is that asphyxia is the sole cause of death; for, as we have elsewhere stated, the pla-

centa is the only organ of hematosis for the child up to the moment when the pulmonary respiration is established; and, therefore, if the circulation in the cord is interrupted by any compression before birth, the blood of the foetus can no longer derive the elements necessary for its renovation from an immediate contact with that of the mother in the placenta; and from that moment the child finds itself placed in the same conditions as an adult deprived of respirable air, and, like him, dies asphyxiated.

In most cases, it is not until after the membranes are ruptured that the descent of the cord exposes it to a sufficient degree of compression to compromise the infant's life. Indeed, if we might judge from some observations of Madame Lachapelle, the pressure which it undergoes is never great enough to obliterate the umbilical vessels, so long as the head is not engaged in the superior strait. But as to ourselves, we are inclined to believe that the simple pressure of the head on the cord may be so considerable as to interrupt the foeto-placental circulation, even before the discharge of the amniotic waters. D'Outrepont relates two cases which confirm this view; and the numerous instances in which we find the meconium mixed in large quantities with the liquor amnii at the time of the rupture of the membranes, can only be explained, in our estimation, by a momentary compression of the umbilical cord.

D. Treatment.—As regards the treatment, the accouchement might be left to the powers of nature: 1. Whenever there is a certainty that the child is dead; 2, when, though the infant be living, the membranes are only ruptured as the head becomes firmly engaged in the excavation, and when, from the fact of the contractions being energetic, there is every reason to hope that they alone will be sufficient to terminate the labour promptly; which, in fact, usually occurs in women who have a non-resistant perineum, from having previously borne children; and, 3, where the head is small, the pelvis large, and the cord situated in front of one of the sacro-iliac symphyses; for then it is only necessary to return the cord into the vagina to protect it from the contact of the air. But, notwithstanding these favorable conditions, it will still be necessary to watch the state of the cord attentively, and to apply the forceps as soon as the pulsations are found to grow weaker or to become intermittent.

Under all other circumstances, the intervention of art will be indispensable. Thus, where the presentation is such as to render a natural delivery impossible, or, even if possible, where the expulsion of the foetus would require a long and painful travail, the forceps should be applied or the pelvic version be resorted to without delay. The former operation will be the only one practicable in a case of occipito-posterior position of the vertex, or in one of a face presentation; supposing both to be firmly engaged in the excavation, and the previous attempts at reduction had proved ineffectual. In a presentation of the breech, the operator ought to search for the feet, if the presenting part be still above the superior strait, or bring down the groins with the blunt hook, if it has descended into the basin.

In a presentation of the vertex or face, where these parts have not as yet engaged in the excavation, we should first endeavor to reduce the cord. Several plans have been recommended for this reduction; but the manual method, the oldest of all, is still entitled to the preference, notwithstanding the great number of instruments that have been proposed for this purpose. The operator can always proceed with greater facility behind, and on the sides of the pelvis, close to the sacro-iliac symphysis; the right hand will be used when the cord is to the left, and the left one if it is at the mother's right. Where the fold is inconsiderable, it will only be necessary to push it up by the middle; but, in the contrary case, it is to be gathered up and pressed back little by little, just as the taxis is usually performed in the reduction of hernia. But merely pushing the cord back into the uterus will not be sufficient to protect it, and it must be carried up above the superior strait, and the hand retained in the vagina during several contractions to prevent it from falling down. Some accoucheurs fearing that it could not be kept in position, notwithstanding this plan, have directed the introduction of the whole hand into the womb, with a view of placing the cord on one of the child's limbs; and though this precaution is useless in most cases, it would certainly be preferable to the pelvic version, says M. Guillemot, where there is a slight retraction of the basin. But the instrumental method must be attempted, where the narrowness of the external parts, or an undilated os uteri, etc., render the introduction of the hand very difficult or impracticable. Some of the various instruments proposed for this purpose might then be used; perhaps M. Dudan's, recommended by M. Guillemot, is one of the simplest and best: He takes a gum elastic (male) catheter of the size No. 9, armed with its stilet, and having a piece of narrow ribbon introduced into the last eye of the catheter, which is retained there by the extremity of the stilet; the ribbon is next attached to the umbilical cord, without drawing it too tight. If the loop of the latter is short, it is applied near the middle, but if long, the cord is to be first doubled up; being thus secured, the extremity of the instrument carrying the cord is then directed along the hand that had previously been introduced into the vagina, and is carried up into the uterine cavity. The hand placed in the vagina contributes to the return of the cord by preventing it from slipping in the noose of the ribbon.

When the reduction is completed, we must wait until the head becomes engaged, before withdrawing the instrument; then the stilet is first removed and afterwards the catheter. Where the reduction proves to be impossible, the pelvic version, if the head is high up, and the forceps, if it is already engaged, are the only resources left us. But whenever the version is resorted to, it is necessary to carry up the cord into the uterus, whilst searching after the feet (Boér), lest it be compressed either by the accoucheur's arm, or somewhat later by the hips and the trunk of the child.

ARTICLE IV.

OF SHORTNESS OF THE CORD.

The cord may be very short naturally; and, as elsewhere stated, it has been known not to exceed four or five inches in length, but such cases are very rare; most generally its brevity is accidental, that is, it results from the numerous turns made around the trunk, limbs, or neck of the child; indeed, the formation of these circular loops is favored by an unusual length of the cord.

The latter, in a case reported by Baudelocque, measured fifty-nine inches, and made seven folds around the infant's neck; and Schneider has seen a cord that measured three and a quarter yards (three metres), and made six turns on the neck. Nothing is more common than to find children whose trunks and necks are encircled by two or three of these folds.

An accidental shortening of the cord may render the accouchement difficult, either by retarding its progress, or by making it absolutely impossible, or by causing the death of the foetus. This latter circumstance may result from the constriction undergone by the vessels in the neck, when the cord is tightly wound around this part; or it may be owing to an interruption of the circulation in the umbilical vessels, produced solely from the stricture of the cord itself, where it closely encircles a limb;* or, again, these two causes may act simultaneously, and determine the child's death much more speedily.

The delay in the travail, caused by a brevity of the cord, is not usually manifested, until the stage of expulsion, properly so called, begins; and then, as M. Guillemot justly remarks, the attendant phenomena will vary according to the point of the placenta's attachment. For where it is inserted at the fundus, it, like the wall to which it is attached, seems to descend at each contraction, and approach the os uteri, but after the pain, it retracts with the fundus to its original elevation. In ordinary cases, the hand can detect this fact by being merely placed over the uterine tumor; but when a very

* This constriction is sometimes exceedingly great, and authors have certainly erred in denying that it could ever be considerable enough to strangle the foetus. Besides, it is not only at the time of labour, and as a consequence of the extensions made by the expulsive efforts of the womb, that an effect of this kind is observed, but these turns may also form during the pregnancy, and their constriction may then be extensive enough to occasion death. Thus, M. Monod met with a fetus upon whose limbs they had left very deep marks, not merely in the soft parts, but even on the bones themselves. The infant's neck often exhibits undoubted traces of them, and in one case, examined by M. Taxil, there were three circular folds around the neck, which was so retracted that its diameter did not exceed two or three lines (four millimetres). It is to such circular turns that M. Montgomery refers those spontaneous amputations, which M. Richerand and some others have supposed were dependent on a gangrene of the part.

short cord is forcibly stretched between the placenta and some part of the child's trunk, a particular phenomenon can be recognized by the touch ; that is, the finger, when applied on the head, finds it advancing during the pain, and retreating as soon as this is over, because at this moment the fundus of the womb, which had been depressed by the contraction, regains its primitive position, and draws after it the placenta, cord, and foetus. But this sign will evidently be wanting where the after-birth is attached to the lateral parts of the uterus.

We have met with a case where the unusual shortness of the cord, which was only nine inches in length, certainly detained the head above the superior strait for fifteen hours after the rupture of the ovum and the entire dilatation of the os uteri ; and we can affirm that, notwithstanding the closest attention, we were unable to verify any of the signs given by former authors ; though it is true that the rapidity in the delivery of the after-birth, after the child's expulsion, did not permit us to ascertain at what point the placenta was inserted.

Before the membranes are ruptured, this phenomenon might be confounded with the head's successive elevation and descent, that takes place in nearly every case of labour. But to avoid such an error, it will suffice to remark, that the ascent of the head then takes place during the contraction, and it only falls back after the pain is over ; being just the contrary of what occurs when the cord is tense. Again, in ordinary cases, when the head engages at the perineal strait, it is found to stand out during the contraction, and to retreat immediately after it (however inconsiderable the resistance of the pelvic floor or the feebleness of the pains may be) from the reaction of the perineum, which, after having been forcibly distended during the pain, retracts strongly, and thereby presses it back into the vagina. But, as Delamotte and Guillemot have remarked, whenever these movements of progression and repulsion merely depend on the elasticity of the perineum, "they are only present : 1, When the head engages at the inferior strait, and then they are the less evident as the pains are more rapid and more energetic ; while, on the contrary, they commence much sooner when dependent on a brevity of the cord, and become more sensible as the head approaches the vulva, because the tension on the cord is then increased ; besides which, they are persistent, whatever may be the strength of the contractions, and are the more marked as the latter become stronger.

2. On the other hand, when the placenta is attached to the lateral walls of the womb, these movements are very obscure, and the diagnosis quite difficult. Though, in both cases, the shortness of the cord is accompanied by pain which is felt at the point of the placenta's attachment, particularly in the latter moments of the parturition ; this pain is a sensation of dragging, or tearing, which commonly coincides with the movements of progression and repulsion ; and which might be compared to those felt by the patient when an attempt is

made to remove the after-birth, before its complete separation." (*Guillemot.*)

The reader will now understand that a shortening of the cord may retard the progress of the head, whether it be still at the superior strait, or whether it has cleared the excavation and is on the point of engaging at the inferior strait. We ought to add that the shoulders may even be arrested, and the delivery of the trunk be prevented after the head's complete disengagement, by the circular turns which are occasionally made around the child's neck by too short a cord. We were witnesses to a case of this kind, that occurred at *la Clinique*, in 1838, where a division of the cord, which was not made until two hours after the head's escape, could alone effect a termination of the labour; the foetus was born dead. Delamotte, (*page 305*), furnishes an instance precisely similar to this.

The intervention of art is therefore sometimes necessary, although it often happens that the trunk is delivered spontaneously. However, the mechanism is not the same in the two cases; for, in those of normal brevity, the head may remain applied against the vulva after its disengagement, without much inconvenience, and the extra-uterine respiration may be established and kept up. In a short time, the womb gradually retracts on the parts of the child that it still contains, and, being itself forced along by the bearing-down efforts of the patient, it sinks into the vagina, and, by thus approaching the vulvar orifice, may easily force the trunk to the exterior. Occasionally, this descent of the womb does not occur at all, or else is not sufficient to permit the child's escape; and then a rupture of the cord, or a detachment of the placenta, can alone enable the uterine efforts to complete the delivery. Thus, in a case of the kind reported by Malgouyré, the discharge of the waters, the delivery of the child, and the expulsion of the after-birth, all occurred simultaneously: and the following instance is related by Dr. Rigby. After two or three hours of severe pains, the foetus was suddenly expelled, and the cord was broken at about two inches from the umbilicus, so that, when the midwife attempted to deliver the after-birth, she could not find the other end of the cord; but, having introduced her hand into the womb, she felt and extracted the placenta; and it was then discovered that the cord had been lacerated at its point of insertion.

In labours complicated by an accidental shortening of the cord, the child's head passes beyond the vagina, and retains its position there until a renewal of the pain; and when the latter comes on, the head is observed to pass to the sides of the vulva, whilst the shoulders, back, and breech successively disengage. This expulsion is sometimes effected so rapidly, that it is difficult to follow it; but, if it be delayed in the least, a prompt intervention is requisite, for, as elsewhere stated, the compression made by the folds around the neck may speedily prove fatal to the child.

In the breech presentations, the accouchement usually terminates in the following manner, when abandoned to itself; the nates, after having been forced down to the vulva by the uterine contrac-

tions, turn up towards the side where the cord is situated, and then the trunk descends, becoming flexed on itself in the passage; so that, by the time the head reaches the excavation, the body of the child forms a curve, whose concavity corresponds very nearly to the symphysis pubis.

Independently of the delay that it may cause in the progress of parturition, and the consequent unfavorable hazards to the foetus, a shortening of the cord may produce other and dangerous accidents to the mother; since it is to this circumstance, particularly, that we must, in most cases, attribute the rupture of the cord, and the premature separation of the placenta (points to which we shall return, when giving the history of uterine hemorrhage). Of course, the danger of these accidents will vary greatly with the period of their occurrence; thus, at the commencement of labour, the bleeding thereby occasioned might seriously compromise the lives of both mother and child, if the resources of our art were not promptly interposed. But, if they do not occur until the moment when the head is ready to clear the vulvar orifice, they may rather be considered in a favorable light, for, as we have just seen, this is one of the means that nature employs for terminating the delivery.

Again, if the cord and the adhesions of the placenta should obstinately resist, it is possible that an inversion, or at least a depression of the uterus, might be the immediate consequence of the child's expulsion; indeed, such an inversion is very apt to occur towards the end of the travail, when the female is urged to bear down, by the distended condition of the parts; and as she still continues to strain, after the cessation of all uterine contractions, the relaxed womb yields the more readily to the action of the diaphragm, which tends to depress its fundus, because the short umbilical cord drags the uterine wall, where the placenta is attached, in the same direction.

Treatment.—The disastrous consequences that may result from a shortening of the cord present different indications for treatment, according to the stage of the labour at which its existence is detected. For instance, when the membranes are still unbroken, if the os uteri be freely dilated, the contractions energetic, and there is every reason to suppose, from the signs before given, that a tension on the cord is the cause of the retarded labour, they should be ruptured at once; for, after the waters have escaped, the uterus will retract, its fundus will approach the cervix, and the cord, being no longer dragged upon, will permit the head to descend into the excavation. But if the head be at the inferior strait, at the time when the alternate movements of elevation and descent begin to manifest themselves during and after the contraction, the forceps should be applied. But where the head has only the resistance of the soft parts to overcome, we must be content with preventing it from remounting in the excavation after each pain, as much as possible, and for that purpose must apply the hand strongly on the perineum; and while sustaining this latter, to favor the escape of the head by pressing it up, so as to aid its process of extension or

disengagement. It would also be advisable to have the hypogastrium compressed at the same time by an assistant, in order to prevent the uterus from ascending during the interval between the pains. Lastly, after the head is delivered, the accoucheur should immediately relax the loops of the cord around the neck, and slip them over it; and where these folds are so tight as to resist the tractions made with that object, they should be divided, but it is not requisite to apply the ligature to the umbilical extremity of the cord at once. But rather, on the other hand, it is necessary in most cases to allow this to bleed a little after the birth, in order to relieve the apoplectic state of the foetus; for, by applying the ligature too soon, we would be deprived of this resource. Nevertheless, where the expulsion is unusually delayed, the foetal end of the cord will have to be slightly pinched between the two fingers to prevent hemorrhage.

A dragging of the cord entwined around the trunk or limbs is not at all unfrequent in the natural labours by the breech, and in those cases where the pelvic version has been effected: and it is to be remedied by making moderate tractions on its placental extremity, and if these are not sufficient, it should be divided, and the accouchement terminated as speedily as possible. The same precepts are applicable in all cases where the brevity of the cord is natural; and if the accoucheur is obliged to carry his hand up into the womb to ascertain the nature of the obstacle, he should take advantage of the occasion to effect the pelvic version, and to draw down the infant until the base of its chest appears at the vulva, when the cord is to be cut and tied, or else compressed with the fingers, and the extraction of the foetus is to be completed at once.

It is advisable to introduce the hand again into the uterus, after the placenta is delivered, to ascertain that the fundus of the organ is neither depressed nor inverted.

ARTICLE V.

MAL-POSITIONS OF THE FETUS.

The ancients applied the term mal-position to all those cases in which the summit of the head did not correspond to the os uteri. But, as we have already demonstrated, the accouchement nearly always terminates favorably, both for the mother and child, in the presentations of the face and breech, though it is a little more difficult than usual; and experience has even proved that it is barely possible in those of the trunk. Nevertheless, the first three presentations offer certain anomalies and irregularities, that may at times render the travail difficult, and require the intervention of art; for, although the presentations of the vertex, face, and breech, are usually free and regular, yet they may be irregular or inclined. (*Vide page 328, et seq.*) But these last so rarely constitute an obstacle to the spontaneous termination of the travail, that we have not hesi-

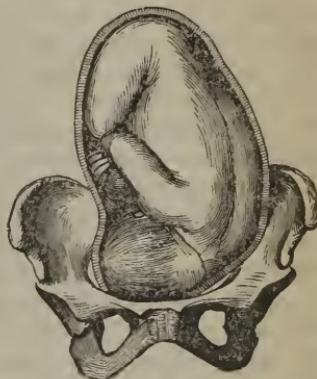
tated to include them in the description, heretofore given, of the mechanism of natural labour. In fact, the only modification they determine in this mechanism is that the head, in clearing the superior strait or traversing the excavation, undergoes a movement of correction, whereby the occipito-frontal or the sub-occipito-bregmatic circumference becomes parallel to the plane of the strait. But this movement is necessary; for, if the head exhibits its normal size, the accouchement is only possible under that condition,* and, when it does not take place, the resources of art are indispensable; and hence we must ascertain what are the indications for treatment presented in these particular cases.

§ 1. INCLINED POSITIONS OF THE VERTEX.

Under this title we include all those positions that have been described, by Baudelocque, as the positions of the sides of the head, of the ears, the temples, and the occiput; the former of which is recognized by the presence of an ear, the angle of the jaw, or by the parietal protuberance; while a presentation of the occiput is detected by the triangular form of the posterior fontanelle, by the lambdoid sutures, and the vicinity of the neck.

In general, when an inclination of this kind is detected at the onset of labour, or shortly after the membranes are ruptured, there is nothing to be done; for it is well known that, in far the greater number of cases, the conversion is effected spontaneously; but, if the head still retains its primitive position for five, six, seven, or eight hours after the discharge of the waters, and its descent is thereby impeded, we must attempt an artificial correction. It is possible to accomplish this with the hand alone, which is always to be tried before resorting to an introduction of the lever or forceps; and it is unnecessary to add that an obliquity of the uterus, if any such should exist in the case in question, must first be remedied. As a general rule, that hand should be used whose palmar face would grasp the vertex the most readily; and, when introduced into the womb (*vide Version*), it seizes the occiput so as

Fig. 80.



The left occipito-iliac position, strongly inclined on its posterior parietal region.

* However, we have known this conversion of an inclined vertex position into a free one to occur at the inferior strait in a woman with her first child; the head was placed in the left anterior occipito-iliac position, and was, at the same time, inclined on the right parietal region. In descending into the basin, it retained this position, so that, when it had reached the pelvic floor, we detected the ear; but it became rectified, after several strong pains, and cleared the inferior strait immediately after having undergone the movement of correction. The head was small, although the fetus was at full term.

to draw upon it, after having first removed it from the iliac fossa; whilst a considerable pressure is made with the other hand over the hypogastric region, in order to force the head to descend. When the correction cannot be effected by the hand alone, most accoucheurs recommend the employment of the lever; but we should decidedly prefer having recourse to the forceps, the blades of which would act at first as a lever in rectifying the head, and then, by their traction, the labour could be terminated almost immediately. Because, where seven or eight hours have been spent (according to our precept) in the vain hope that the powers of nature would be adequate to rectify the inclination; and, where the operator has unsuccessfully attempted to produce the correction by his hand alone, it must be evident that an early termination of the travail is indicated for the double interest of the mother and child; and that, consequently, the forceps should be preferred in such cases to the lever.

The non-inclined vertex positions may, likewise, offer certain anomalies in their mechanism that deserve attention; thus, the movement of rotation, which, in the transverse positions, is calculated to bring the occiput under the pubic arch, is occasionally delayed for a long time, and thereby greatly retards the labour. When this delay is dependent on the feebleness of the uterine contractions, an application of the forceps is the best remedy. But, according to many authors, it may also be owing to what Levret called the wedging-in of the shoulders; that is, the latter then present their long bis-acromial diameter to the smallest one of the superior strait, and thus become firmly engaged or wedged there, in such a way that they cannot descend any further, and therefore they arrest the subsequent progress of the head. This wedging of the shoulders, which can scarcely occur without a more or less considerable retraction of the abdominal strait, has been detected by Levret, by Delamotte, by Ruysch, *et al.*, and its occasional occurrence is admitted by Desormeaux and Dugès; and, consequently, it should be regarded as being possible. This cause of dystocia would scarcely ever be suspected during the travail, unless it were by the mobility of the head in the excavation (Fried); which is the only sign that would be likely to arouse attention, where a normal conformation of the inferior strait has been ascertained, and where the contractions are strong and well kept up. Under such circumstances, Levret advises (and Desormeaux seems to approve this counsel) the patient to be placed on her elbows and knees, with her head declining, with a view of removing the weight of the child's shoulders from the mother's parts; and then the accoucheur should slip his hand along between the head and the pelvic walls, seize the shoulder that is locked at the sacro-vertebral angle, and then draw it to one side and change its position. Although the performance of this manœuvre is attended with difficulty, yet it is the only one practicable if the foetus be living; but where it is dead, he ought to diminish the head by craniotomy, so as to open a more ready passage up to the shoulders.

The movement of rotation, whereby the occiput comes under the

symphysis pubis, may likewise be rendered difficult, or even wholly impossible, by the size of the sero-sanguinolent tumor of the scalp, that is always formed when the head remains in the excavation for some time; for, by engaging itself in the void of the pubic arch, this tumor may render the movement of rotation absolutely impossible. (Harnier.) Of course, the forceps must then be applied.

§ 2. INCLINED POSITIONS OF THE PELVIS.

Sometimes one hip, at others the lumbar region, or the lower part of the abdomen (according to the direction of the inclination), may engage first at the upper strait; particularly where the uterine obliquity is well marked. We must, therefore, correct this obliquity, which is the original cause of the anomaly; then, if that is not sufficient to replace the breech in a horizontal position, the feet are to be sought after and brought down.

§ 3. INCLINED POSITIONS OF THE FACE.

The face positions may likewise be irregular; that is, it may either happen that only one cheek engages, in consequence of some lateral inclination; or else that the head, being but little extended, the forehead is found at the centre of the superior strait; or, on the other hand, this extension being carried to an extreme, that the chin and the front of the neck are alone accessible to the finger; but in all these, as in the preceding cases, nature herself is generally sufficient to accomplish the delivery. The instances in which the forehead is first placed at the centre of the upper strait are quite frequent; but the extension being completed at the moment when it engages in the excavation, the face then becomes completely horizontal. (Vide *Mechanism of Labour by the Face*.) And the same is true of the *malar* positions, the correction of which, like that of the *parietal* positions of the vertex, is effected during the period of descent. In those rare cases where the inclination resists the power of the uterine contractions, the correction with the hand at first, then, in case of failure, the application of the forceps, if the head is engaged and immovable, or the pelvic or cephalic version, if it be high up, and can easily be displaced, appear to us the proper measures.

The spontaneous reduction, just alluded to, as the most ordinary termination of the frontal or malar positions, is much more difficult in the cases where the chin, in consequence of the head's excessive extension, has a tendency to engage first, and approach the centre of the excavation. For then, according to the observation of Madame Lachapelle, the head not only presents its unfavorable diameters, but the trunk likewise shows an inclination to descend along with the face; though at the same time it presses the latter back from the passage, and thus creates an obstacle to its escape, while the contraction transmitted by the spine rather tends to augment than to correct the inclination. Under such circumstances, we can trust less to the powers of nature, and therefore must endeavor to change the position by a resort to the cephalic or the pelvic version.

It is well known that, for the accouchement to terminate sponta-

neously in the face positions, they should be converted into mento-pubic ones; but this process of rotation, which is easily effected in the mento-anterior varieties, that is to say, in the cases where the chin was primitively in relation with some part of the anterior moiety of the pelvis, is much more difficult in the mento-posterior positions, and sometimes even it does not take place at all. And it must be acknowledged that an unreduced engagement of the face, and its want of tendency to reduction, constitute one of the most serious difficulties met with in the obstetrical art.

Now, with a view of more clearly specifying the various indications for treatment that may present under such circumstances, we will suppose four different cases of face positions, namely:—

1st. A woman has been in labour for a considerable time, the membranes are ruptured, and five or six hours, or even more, have elapsed since the waters escaped, during all which period the uterine contractions have been very strong; a good conformation of the pelvis, and a complete dilatation of, and no resistance from, the os uteri are recognized by the touch, and yet the presenting part still remains high up and does not engage in the excavation; but, in searching for the causes that retain this part at the superior strait, under so many favorable circumstances, it is found that the face presents in a mento-posterior position. Here there would be reason to conclude, in my estimation, that the delay in the travail is dependent on the non-reduction of the mento-posterior position into an anterior one; and, therefore, I think that an attempt should be made to convert the face position into one of the vertex. This could be done by introducing that hand whose palmar face embraces the summit most readily; that would be the right one when the chin is directed backwards and to the right side, and the left in the opposite case; then, after having grasped the head with the whole hand, endeavor to push it up above the superior strait, and, if successful, turn the vertex with the palmar face of the four fingers, and flex the head on the chest, when, the position of the face being converted into one of the vertex, the uterine contractions will accomplish the rest.

2d. If to the mento-posterior position just described, whether the face be engaged or be still above the abdominal strait, any *accident whatever* be joined that demands a *prompt termination of the labour*, it is evident that the pelvic version is the only operation that could be resorted to with a prospect of advantage.

3d. If the mento-posterior position is coincident with a moderate retraction of the basin, and any unfavorable circumstance requires a speedy termination of the travail, it seems to us that the proper course would be to first endeavor to effect the conversion of the facial into a vertex position, in the manner above described, and then to apply the forceps on the flexed cephalic extremity. This suggestion might admit of much explanation, which perhaps would not be in place here, and we shall only say, in justification, that the pelvic version is to be avoided as much as possible in all cases of deformity of the pelvis; and that the application of the forceps on the face, in

the mento-posterior positions, seems to us an extreme measure, which should only be employed when nothing else can be done, as in the next variety.

4th. Lastly, there are some unfortunate cases where it is impossible to push up the presenting part, either because the head has cleared the cervix uteri, or because the womb's strong retraction renders every attempt abortive; and, therefore, both the pelvic and the cephalic versions are altogether out of the question. The accoucheur must then necessarily have recourse to instruments. The lever, the common forceps, the crotchet, and the embryotomy forceps, have all been proposed in turn; but, before resorting to the latter, the first should always be tried.

In certain cases, the lever has proved very useful, and, where applied on the vertex or occiput, it has occasionally depressed this part, and thus converted a face presentation into one of the vertex. It is oftentimes more easily managed than the forceps, when the head is high up, owing to the difficulty of getting the second blade of the latter up to the proper height and position; and I may mention that it proved very serviceable in a case to which I was called by Dr. Fournier, where the head had engaged in the excavation, in the right mento-posterior position, and could neither be pushed up nor advantageously grasped by the forceps.

I believe that many practitioners have erred in banishing this instrument altogether from practice, or nearly so; for the lever, in my opinion, may render very important aid in those posterior positions that approach a transverse character; and in which, from being still high up, an application of the forceps is exceedingly difficult. (*Vide Lever.*)

As to the forceps, though proscribed by Madame Lachapelle, in the cases under consideration, it may be tried as a dernier resort, as that would be far better than embryotomy when the child is living; but, to be successful, it is necessary that the operator should be well versed in the movements that are to be given to the head by the instrument. Thus, supposing the blades are properly applied on the sides of the head (and the difficulty of this is well known), should we attempt to bring the chin round in front (Smellie)? or would it be better, by leaving the chin posteriorly, to endeavor to depress the forehead and occiput, and then to disengage these parts first under the pubis? Relying on the cases published by former authors, I do not hesitate to decide in favor of the last manœuvre; for every practitioner must acknowledge that the rotation of the chin forwards exposes the child to very great dangers from the extent of the movement in the atloido-axoid articulation; for the two favorable cases reported by M. P. Dubois, which he himself considers as exceptions, cannot make us overlook all those in which this excessive rotation has cost the child's life. Besides, even were the latter dead, the remembrance of Smellie's want of success would alone induce us to reject this operation as being more difficult, and, consequently, more dangerous to the mother, than direct tractions on the vertex.

Grounding myself, therefore, on the observations of Smellie (t. xi.

p. 579), of Meza (*Acta regiae Societatis Med. Hauniensis*, t. xi. p. 379), and of Siebold (*Siebold's Journal*, an. 1830, p. 209), I should not hesitate, after having applied the blades as accurately as possible on the sides of the head, to draw directly downwards and backwards, with a view of depressing the vertex.

I am well aware of the objections to this mode of procedure, and that it may be said that, during the movement of flexion, which you impress on the head, the long occipito-mental diameter must necessarily pass one of the diameters of the excavation, thereby often creating an insurmountable obstacle to the delivery. I do not deny the force of this objection, and am willing to confess that in theory it is not altogether satisfactory; though what avails the inefficacy of theoretical opinions, where positive facts bearing on this point can be adduced, and some of which I have just quoted. But the somewhat material authority of facts is not the only one I might invoke; for, does not our reason tell us that, when any of those cases (that are fortunately very rare) are presented in practice, which seem beyond the pale of all theoretical notions, and in which the practitioner is constrained to do what he can, not what he would, the wisest course is to follow as closely as possible the route traced out by nature? Now, has it not often happened that the labour terminated alone, in the mento-posterior positions of the face, and yet the chin has remained behind throughout? And what has been the mechanism under such circumstances? By consulting the published cases, we shall find that the uterine contraction was incapable of depressing the chin, and has seemed to transfer its action to the occiput; and then the forehead, the vertex, and the occipital extremity, by slipping behind the symphysis pubis, have successively appeared at the centre of the pubic arch. Is it not, therefore, logical to recommend an attempt to impress the same movement of flexion on the head, under a hope that the tractions by the instrument, coming to the aid of the expulsive efforts of the womb, would succeed in accomplishing what these latter alone could never effect?

Again, there are some unfortunate cases in which, after having vainly attempted all the different manœuvres just referred to, a mutilation of the child becomes our only resource.*

* I have quite recently witnessed a case of this nature, with Dr. Letannelet, who requested my attendance on a young lady in her first labour. I saw her at eight o'clock in the evening, and detected, as my learned associate had previously done, a right mento-posterior position (the frontal variety): the head had been firmly engaged since three o'clock in the afternoon, and from that hour had not advanced a single line. At eleven, as no change had taken place either in its position or elevation, we attempted unsuccessfully to push it up. Both M. Letannelet and myself tried the lever and the forceps, in vain; but before resorting to craniotomy, which was then deemed indispensable, we requested M. Dubois to see the patient. He arrived at one o'clock in the morning, and renewed the attempts that we had before made, without any better success, and craniotomy was then decided upon; but as the woman had great need of rest, and the necessary instruments were not at hand, the operation was deferred until eight o'clock, A. M., when it was accomplished with much difficulty; for, notwithstanding his dexterity, M. Dubois had the greatest trouble in extracting the head with the embryotomy forceps.

Do not the supposititious cases just given (which could easily be sustained from the facts reported in the authors), by rendering us acquainted with the various difficulties that may be encountered in these cases, lead us to adopt, for the mento-posterior positions, the rules heretofore laid down by Baudelocque, Gardien, and others, for all face positions? And though, in the present state of our science, the mento-anterior positions should be abandoned to nature, yet does the same rule hold good with regard to the mento-posterior ones? In a word, if this last position be clearly recognized before or shortly after the membranes are ruptured, should we not, prior to the engagement of the face, and while the head is still movable, endeavor to convert it into a vertex position, and thus prevent the difficulties that might subsequently arise? If I had to decide under such circumstances, I would certainly resolve the question in the affirmative.

§ 4. POSITIONS OF THE TRUNK.

A natural delivery in the trunk presentations is a very unusual occurrence, and one upon which the accoucheur should never rely. It is therefore an absolute rule in practice to attempt to bring one extremity of the foetus to the superior strait as soon as possible, by resorting either to the pelvic or the cephalic version. (For the divisions, causes, and diagnosis of this mechanism, see *Natural Labour*, page 359, *et seq.*; and for the indications, the chapter devoted to *Version*.)

§ 5. COMPLICATED POSITIONS.

Under the title of "fallings" (*procidentiae*), Madame Lachapelle has described the untimely descent of any part whatever of the child, which cannot of itself constitute a particular position on account of its tenuity or mobility, but which, however, might complicate the presentation of a more extended region. Thus, the umbilical cord, the feet, or the hands, may individually or collectively come down at the same time as the head or breech; but this complication will be very readily detected by the touch, and therefore it is unnecessary to enumerate the peculiar signs that distinguish each of these parts.

We have already spoken of a falling of the cord, and of the means of remedying it. Again, in those cases where one hand has slipped under the head or breech, the labour may terminate alone if the pelvis is well formed and the contractions are strong and continued; and hence we should delay all operations. Even the presence of both hands on the lateral parts of the head has not always proved an insurmountable obstacle to the spontaneous termination of the travail, for all these parts have occasionally been expelled together; but if the passage be somewhat retracted and the soft parts resistant, it would be advisable to terminate the accouchement artificially by the application of the forceps or by the version, according to whether the head has or has not cleared the superior strait; and to bring down the feet in the breech presentations. This

latter plan should also be followed if one foot instead of the hand, or if both a foot and a hand accompany the head. Nevertheless, before resorting to an artificial delivery, the accoucheur should always endeavor to push back the hand or foot into the uterus and get it above the head. Most frequently, it will only be necessary to sustain it there during the pain, which urges on the head, to find the latter descending alone and arriving at the inferior strait, and then the labour may be abandoned to nature. We must remark, however, that a foot is far more difficult to return than the hand, and that in consequence of its volume it often constitutes an obstacle which cannot be surmounted by the ordinary resources; wherefore, craniotomy is sometimes indispensable, as several recorded observations fully prove.

A descent of the foot has hitherto only been observed, I believe, in the presentations of the *flexed* cephalic extremity; but I have had an opportunity of meeting with it in a *face* presentation; and the rarity of the circumstance, together with the difficulties that attended the delivery, induces me to narrate it here in detail:—

I was suddenly aroused on the 4th of November, 1842, at five o'clock in the morning, by M. X***, a pork butcher in la rue du Cadran, who came to request my attendance on his wife, who had been in labour for two days previously, under the care of Doctor Lorne, her physician and accoucheur. Having arrived at the bedside of the patient, I learned the state of the case from my worthy associate, after which I proceeded to an examination per vaginam. But before stating its result, I must transcribe here a short account of the case, sent me by M. Lorne himself, who gives the detail, much better than I could (from simple recollection), of what he learned of this woman's previous history, as also an account of what occurred during the labour. He says—

"I was summoned to la rue du Cadran, No. 7, on the 2d of November, 1842, at six o'clock in the evening, to attend Madame X*** in her confinement. I ascertained from the patient that she had had seven children, and from her account the former labours had terminated in the following manner, namely:—

"1. First child: a long and painful travail of three days; presentation of the cephalic extremity; the labour was natural, but the infant died a few days after its birth.

"2. Second and third child: presentation of the pelvic extremity; delivery spontaneous, or by the aid of simple tractions; both children dead.

"3. Fourth child: the uterine contractions disappeared for twenty-four hours after the rupture of the bag of waters; expulsion of the child during the accoucheur's absence.

"4. Fifth and sixth child: presentation of the cephalic extremity; travail long and painful; delivery natural. One of these infants lived a few months.

"5. Seventh child: shoulder presentation and a descent of the arm. M. P. Dubois, having been called in consultation, ascertained the child's death, and performed embryotomy. After the parturi-

tion there was an inflammation of one or more of the abdominal organs.

"Madame X*** is thirty-two years of age, is of a medium height and sanguineous temperament, and exhibits all the evidences of good health. Nothing in her external organization would lead us to suspect the existence of any vice of conformation in the pelvis, and the normal pregnancy seemed to be at its regular term. The preceding night she experienced some pains, which passed off in the morning, but again reappeared at six o'clock in the evening. I examined her, soon after my arrival, and found the os uteri dilated to the size of a five franc piece: I readily distinguished the bag of waters, which was relaxed in the intervals, but was tense, and protruded through the uterine orifice during the pain; but I could recognize no part whatever of the fœtus. At midnight, the amniotic sac projected into the vagina like a *stuffed pudding*, and descended nearly to the vulva, when it soon ruptured spontaneously and permitted the escape of more than two pounds of the waters. But still I could touch no part of the child, even after the discharge of the waters, at any height within the reach of my finger. Now, however, the scene suddenly changed; for the pains, that were hitherto strong, died away; and, as the patient assured me that the uterine contractions had been thus suspended for twenty-four hours in a former labour (the fourth), and afterwards regained a sufficient degree of force to terminate the accouchement, I had her replaced in bed.

"I found the woman in the same condition at eight o'clock in the morning of the next day, the 3d of November; some pains were perceptible in the left groin and flank, but the parts of the fœtus were still inaccessible; * * *. No notable change occurred in the course of the day. Nine P. M. I recognized the left leg and foot lying across the os uteri at the superior strait; the pains were very strong, though they had not the characters of the expulsive ones.

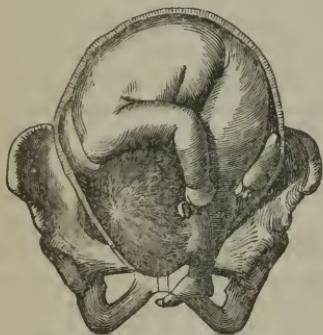
"Nov. 4th, the pains were stronger, but the travail did not advance. As the os uteri was sufficiently dilated, I concluded to search after the second foot, but it proved to be rigid, and would scarcely permit the hand to enter. I found a hard and rounded tumor just above the foot first detected, which I suspected to be the head. But after making some vain attempts to push it up, and to find the right foot, I sent for M. Cazeaux."

Having received this history of the case, I proceeded to an examination of the state of the parts. I found a foot at the upper portion of the vagina, which proved to be the left one, with its heel directed backwards, and a little to the right; then, by passing my finger behind the symphysis pubis, I detected a voluminous tumor, which was pressed so forcibly against the anterior arch of the pelvis, that I could not insinuate the finger between it and the pubic symphysis; at first, I thought it was formed by the right buttock, and I diagnosticated a right posterior position of the breech, with the left limb doubled up on the anterior part of the belly, and the other, on the contrary, stretched out along the abdominal and thoracic plane

of the child. The contractions again became strong and energetic, but, notwithstanding the complete dilatation of the cervix, the presenting part did not engage. While searching for the cause of this delay, I carefully examined the basin, and detected a considerable prominence of the sacro-vertebral angle, whereby the antero-posterior diameter was reduced to three inches and one-eighth at the most. I then resolved to draw on the foot, but, to my great surprise, these tractive efforts proved wholly ineffectual. By again placing my hand on the tumor, that I had originally taken for the anterior buttock, I found it to be harder and much more voluminous than I had at first supposed, and I recognized it as the head, surmounted by a large and soft tumor, or *caput succedaneum*. I tried in vain to find the sutures and fontanelles; but, by gently slipping the fingers between this tumor and the leg belonging to the presenting foot, I felt a very irregular surface, and soon after recognized distinctly the eyes and eyelids, and then the other signs of a face presentation. It was, in fact, an irregular presentation of the face, in which the chin was directed backwards and to the left, and

it was somewhat engaged at the superior strait (a left mento-iliac position, and the head not completely extended; or, in other words, Baudelocque's fourth position of the forehead). To sum up, I was in attendance on a woman whose sacro-pubic diameter was but three inches and one-eighth at the outside, and whose foetus was presenting in an irregular or frontal variety of the left posterior mento-iliac position, and this complicated by a descent of the left foot; besides which, the waters had been entirely evacuated for thirty-two hours, and the uterus was strongly retracted. I

Fig. 81.



The left posterior mento-iliac position complicated by a descent of the left foot.

was not discouraged, however, by all these difficulties; my first thought was to push up the foot that had become engaged under the head, but all such efforts proved abortive; I then applied (though not without some trouble) a fillet on the foot, and endeavored to press back the head, while drawing at the same time on the fillet; but this was equally unsuccessful, for the head was firmly sustained by the powerful contractions of the womb, and did not move. As the child was still alive, I next decided on an application of the forceps. The introduction of the blades and their articulation were effected both without difficulty and without much suffering to the patient, and they were placed on the sides of the pelvis; but, notwithstanding the most powerful tractions which were kept up for half an hour, I could not make the head advance in the least degree. After resting for a few moments, I withdrew the instrument in order to re-apply it, and this time I was fortunate enough to place the blades directly on the sides of the head; I then com-

municated to the handles a slight rotary movement, so as to get the face in a transverse position. But all proved ineffectual, for I drew with all my force, and M. Lorne succeeded me; both of us exhausted our strength to no purpose, and I then withdrew the forceps, and permitted the woman to rest for an hour. Having decided on a resort to craniotomy, if a third application should be equally unsuccessful, I requested my associate to go, during this interval, after Smellie's scissors, and the embryotomy forceps. An hour afterwards the common forceps was again introduced and easily applied, and tractions on the foetus were once more made by M. Lorne and myself for half an hour without any better success.

Being then fully convinced of the impossibility of a natural delivery, and of the impotence of our efforts; as also that, notwithstanding the existence of the heart's pulsations, the unusual delay in the labour (thirty-two hours after the amniotic sac was ruptured), and the compressions made by the instrument, must have necessarily compromised or even destroyed the viability of the foetus, and having only to choose between a bloody operation on the mother or a mutilation of the child, I resolved on the performance of embryotomy. Smellie's scissors, covered at their points by a little pellet of wax, were guided along the palmar surface of my left hand, and directed perpendicularly on the head, where they had to penetrate through the soft parts to the depth of nearly an inch before meeting with any resistance from the osseous vault; I then rotated them, and they entered into the substance of the brain without difficulty; I next opened the blades in two different directions, so as to make a crucial incision, the radii of which were about half an inch in length; then penetrating still deeper into the cerebral substance, I worked the scissors in various directions so as to break up the brain. After which the male and then the female blade of the embryotomy forceps were introduced, and locked without any trouble, as also without pain to the patient. The articular part touched the vulva. By aid of the vice, I next closed the instrument, leaving only a space of about one inch between the ends of the handles, and tractions were then made; but I soon found the blades slipping. It was necessary to begin the operation anew, and the same accident occurred again. The third time the slipping commenced, and I only succeeded in arresting it by suspending the tractions, and closing the forceps more firmly, when the head was finally extracted; but the chest was arrested at the superior strait, and considerable efforts were still necessary for the extraction of the rest of the trunk. The delivery of the after-birth, being immediately effected, presented no particular difficulty.

The unfolding of the lower limbs in the positions of the pelvic extremity, and the stretching out of the arms in that of the shoulder, are merely concomitants of the principal presentation, and should not be looked upon as an unfavorable complication. The deviation of the arm, or the presentation of *the hand or arm* of certain authors, has been considered by them as one of the most grave complications of labour; but it has already been shown, in the article on

Spontaneous Evolution, that a descent of the arm rather favored this latter process than otherwise; and we shall hereafter see that it is only from circumstances foreign to the presence of the arm itself, that the version is at times rendered more difficult. (Vide *Pelvic Version.*)

BOOK III.

OF THE DISEASES AND ACCIDENTS THAT MAY COMPLICATE THE TRAVAIL, AND REQUIRE THE INTERVENTION OF ART.

THE numerous causes of dystocia that have just been studied, are not the only circumstances which, by disordering the regular course of nature, may require an artificial termination of the travail; for, even when surrounded by the most favorable conditions, the accouche-
ment may possibly be complicated by the occurrence of some accident serious enough to compromise the life of either the mother or the child in a few minutes. The student should render himself perfectly familiar with the indications presented by these formidable accidents, because their suddenness and danger will rarely permit him to reflect a long time on the choice of the most suitable means to be employed; and we cannot, therefore, too strongly urge practitioners to make them a subject of serious and profound study.

CHAPTER I.

OF PUERPERAL HEMORRHAGE.

HEMORRHAGE is certainly one of the most frequent and at the same time most dangerous accidents that can be manifested in puerperal women, whether before, during, or after the parturition; for it is most generally fatal to the child, when it occurs at an early period of the pregnancy, and it always subjects the mother to the greatest dangers, whatever may be the stage at which it is developed. Under the double aspect, therefore, of the mother's safety, and the child's life, it constitutes a pathological phenomenon which should interest every one in the highest degree; not only every physician who devotes himself more especially to the practice of midwifery, but likewise all who are engaged in the practice of medicine; for any one may be summoned in a time of pressing danger, and all may, by ill-directed or proper attentions, compromise or save the lives of two beings equally

dear. The importance of the subject, therefore, will justify the detail into which we propose entering.

We designate as puerperal hemorrhage (or the hemorrhage that occurs in the puerperal state) every hemorrhagic accident that pregnant women may be affected with, either during the gestation or in the course of the travail and lying-in; thus, comprising under this denomination, not only the losses of blood that have their source and seat in the genital organs, or in the foetus and its appendages, but also all the effusions that may take place into the tissue of the principal viscera that result in consequence of an *exaggeration* of the modifications impressed on the general circulation by pregnancy. But we shall devote a more particular attention to the discharges that have their source in the vessels of the uterus, or foetus, or their appendages. As to the other hemorrhages, whatever be their origin, or the seat of effusion, they present the same indications for treatment in the puerperal state as at any other period of life, and consequently do not claim our attention here. For, during the labour, whether the hemorrhage have its source in the lungs, the stomach, or the brain, the only thing to be done is to combat it by the usual means, if the dilatation of the os uteri is not sufficiently advanced to admit of an artificial termination of the travail. But in the contrary case, the accoucheur should apply the forceps at once, or resort to the version, and thus relieve the patient as promptly as possible from the danger that threatens her.

ARTICLE I.

OF THE CAUSES OF UTERINE HEMORRHAGE.

The causes of uterine hemorrhage have been divided into the predisposing, the determining, and the special causes.

§ 1. OF THE PREDISPOSING CAUSES.

We must place in the first rank of the predisposing causes, all the disorders in the general circulation that are induced and kept up by pregnancy, and which are manifested by palpitations of the heart, by hurried respiration, the varicose swellings of the inferior venous trunks, and by the fullness and greater activity of the pulse; but, above all, it is particularly important (in order to understand the mode of action of the causes described below) to bear in mind the changes that have occurred in the structure of the womb itself; which changes have been studied in detail, when describing the anatomical phenomena of gestation, but we again bring them forward in a summary way for the better illustration of the subject under consideration.

The mere fact of conception produces a state of orgasm in all the genital organs, the uterus, particularly, which determines a considerable afflux towards these parts. In some women, of a sanguineous temperament, this state of irritation is not confined to the

secretion of the plastic and coagulable lymph for the formation of the caduca, but the serous exhalation is often complicated with or followed by a bloody one; and then, in the course of a few days, a uterine hemorrhage takes place that seems to be only a menstrual return, but which, in reality, occasions an interruption of a commencing pregnancy. In certain cases, this fluxion is not limited to the uterine vessels; for, when very considerable, it causes an aneurismatic or a varicose swelling in the neighboring parts, such as the vessels in the broad ligaments, which run to the tube or ovary; and these trunks occasionally give way, and determine a mortal hemorrhage, as Al. Leroy says he found to be the case in two women who died a few days after marriage.

During the first month of its intra-uterine life the ovum occupies only a very small portion of the uterine cavity, all the rest being filled with the pouch formed by the caducous membrane; and hence, being free and floating, and having as yet contracted but feeble adhesions with the walls of the organ, the product of conception can only be developed by imbibing the juices secreted on the internal surface of the womb (*vide Nutrition of the Fœtus*); which secretion requires a much greater activity in the circulation of the uterus, and may become a source of profuse flooding, under the influence of the least disorder. Somewhat later, the placenta begins to be developed, and with it those numerous vessels which, coming from the internal face of the uterus and the external one of the chorion, appear, so to speak, to run to meet each other; then they interlace without inoculating, and ultimately become united, forming a mass that is held together by a species of flaky lymph, a product of the uterine secretion. Now, who does not see in this process of vascular organization, in this copious secretion that is constantly going on, and requiring so much activity in the circulation of the organ, a continual predisposition to hemorrhage? For, if any vivid moral impression, or any violent physical commotion, disturbs the harmony that presides over this new creation, for a single instant, by causing a derangement in the circulation, the just relations established between the ovum and the womb are at once destroyed; and the blood, being forced too rapidly into these vessels of recent formation, breaks down the resistance offered by their feeble walls, and a flooding results in consequence.

At a still more advanced period of the gestation, when the placenta is organized, the production of hemorrhagic accidents will be singularly favored by the double circulation of which it is the seat, by the great development of the uterine vascular apparatus, and by the peculiar structure of the utero-placental vessels. Quite recently, M. Jacquemir has carefully studied the influence of each of these circumstances, and the following summary will serve to illustrate the results of his inquiries. When we examine the uterus of a pregnant woman in the latter periods of gestation, after having undergone its usual transformations, we are struck with the development of its vascular system; for the trunks of the four arteries that nourish the organ have increased in size, and their divisions or rami-

fications in the texture of the womb are wonderfully multiplied; and those vessels that existed before the impregnation have more than doubled their calibre, and a great number of others that did not exist, or rather were not visible, have successively formed, become enlarged, and ultimately attained a considerable size. We have hitherto mentioned (*Vide art. Pregnancy*) the extraordinary development of the uterine veins; and it is only necessary to recall here the feebleness of their walls, which are composed of a single coat, their adhesion to the uterine tissue, and the numerous divisions sent by them into the cavity of the organ, which penetrate directly or indirectly into the substance of the placenta itself. It results from this arrangement that, in the arterial system of the womb, the blood passes from trunks of a moderate size into vessels that are greatly multiplied in number, and, collectively, are very spacious in proportion to the volume of the trunks; which cavities or vessels are constituted by the numerous ramifications given off from the latter in the substance of the uterus; while, in the venous apparatus, a much greater disproportion exists between the trunks of the uterine and ovarian veins and their branches, so that the blood passes from very large cavities into narrower tubes.

This arrangement has been considered by M. Jacquemier as a cause of the retardation in the uterine circulation, and as being calculated to produce a venous stasis, followed by an engorgement of this system, and, as a consequence, the rupture of the vessels and hemorrhage; which venous rupture is further favored by the defect of resistance on the part of the utero-placental veins. For, according to his view, all the causes under whose influence floodings are found to result, merely act by producing this engorgement of the uterine venous apparatus; and hence the immediate cause of hemorrhage is the rupture of one of the vessels appertaining thereto.

But we cannot fully embrace this theory, so far, at least, as regards the hemorrhages that occur during gestation, for we do not believe that the retardation in the circulation is so extensive as M. Jacquemier has described; because, although the blood arriving by the uterine arteries passes into the larger cavities constituted originally by the arterial and afterwards by the venous ramifications (the uterine sinuses), yet it seems to us that this cause of delay would be compensated by the rapidity with which the blood contained in these venous capillaries must pass into the trunks where they empty; and even by virtue of that very law of hydraulics quoted by M. Jacquemier in favor of his theory; namely, "when a liquid flows through a uniform tube, the quantity of this liquid which, at a given moment, traverses the different sections of the tube, must everywhere be the same. Consequently, as the tube becomes larger, the rapidity diminishes; but it increases as the tube retracts." If, therefore, the course of the blood is relaxed in the arteries by its passage from the main trunks into the ramifications, it must be accelerated in the veins by its passage from the ramifications into the trunks; and hence there must be a compensation in its rapidity.

But it is known that an infinity of circumstances may destroy this

harmony; and which series of vessels will then be the seat of the congestion, and afterwards of the rupture? M. Jacquemier supposes that some point of the venous system will always yield the first; for he says, "Every part of the uterine vascular circle is not equally exposed to this species of rupture; and the arteries would even be wholly exempt, unless they were the seat of some morbid lesion. The utero-placental arteries themselves would rarely be a primitive seat of rupture from the mere impetus of the blood, although the surrounding delicate tissue in which they ramify supports them in a much less perfect manner than the elastic tissue of the womb, and besides is easily torn; but the utero-placental veins, from their situation and organization, can afford but a very moderate resistance, which will frequently be overcome." No doubt, the venous parietes are less resistant than the arterial ones; but which of the two has the greater shock to bear? For do not all the causes, under whose influence the uterine congestions and subsequent hemorrhages are produced, act first on the arterial blood, before being perceptible in the venous system? And is not the plethoric condition first manifested by a fullness of the pulse? M. Jacquemier supposes that, as the circulation is impeded in the vena cava inferior, it must determine a reflux of the blood contained in these vessels; which reflux would be primarily felt in the uterine veins, and then in their ramifications; and this would likewise be favored by the particular structure of the uterine veins themselves, which, during gestation, at least, are deprived of valves.

This absence of valves must certainly favor the reflux of the venous blood; and it is possible that, under the influence of some of the causes enumerated by this writer, a congestion and then a venous rupture might be the primitive phenomena; but we cannot admit that this is generally the case, in the hemorrhages that occur during gestation. And whilst acknowledging that our "confrere" has rendered an important service to the profession, by calling attention to a particular variety of mechanism in the production of uterine hemorrhages, we must persist in considering his theory as being only applicable to a small number of cases. (Vide *Archives Générales de Médecine*, 1839.)

I must yet bring forward another anatomical peculiarity, which, perhaps, will serve to reconcile two conflicting opinions; for it has been said by some persons that all the uterine hemorrhages proceed from a separation of the placenta; while others contend that many of them simply result from a sanguineous exhalation, which takes place from that portion of the internal surface of the womb not occupied by the placental insertion. Doubtless, the floodings that occur during pregnancy are most frequently caused by a rupture of one or more of the utero-placental vessels; but it is not to be supposed that this rupture is the only source of hemorrhage, for we have already seen that, in the early months of gestation, the ovum only occupied the uterus in part, all the rest of its cavity being in contact with the external face of the caducous membrane; and that, in consequence of the greater activity in the organic circula-

tion, a sanguineous exhalation might take place from the internal surface of the matrix. This fact is unquestionable; but even after the placenta is completely formed, and the ovum occupies the whole cavity of the womb, there are still, as elsewhere described, some arterial and more particularly some venous radicles found existing externally to the placental mass, that might give rise to a hemorrhage, in which the proper utero-placental relations would be in no-wise concerned.

From the foregoing, it would appear that a hemorrhage may take place during gestation: 1st, by sanguineous exhalation, especially during the early stages; 2d, from a rupture of the veins, or, more often, of the utero-placental arteries, properly so called; and, 3d, from a rupture of the veins and arterioles that ramify in the substance of the caducous membrane beyond the placenta.

Among the anatomical modifications impressed on the uterus by gestation, the development of its muscular structure has recently been pointed out by M. Gendrin as a predisposing cause of hemorrhage. At the close of pregnancy, the womb is formed of two evident layers, an external one consisting of longitudinal fibres, and an internal one of circular fibres; and it is the relation of these two muscular laminae with the vascular one that explains, according to his view, the influence that it has over the production of flooding. For this double muscular layer, may, under the influence of various external or internal irritants, become affected with spasms, which produce irregular contractions in some part of the organ. He states that such spasmoid contractions are very frequent after the third month, and that they are often observed to follow external, moral, or physical impressions, or the tumultuous movements of the foetus, or, indeed, when the vitality of the latter has ceased. The patient first becomes conscious of it by some peculiar sensations and movements in the uterine globe; and when the gestation is somewhat more advanced, the hand, applied on the abdomen, enables us to ascertain that the sense of movement felt by the woman is dependent on a real contraction in the uterine walls; which gives rise to certain irregular elevations, that slip about and become displaced under the hand by something like a peristaltic movement, of which the patient has always a very distinct perception. These contractions frequently accompany the hemorrhage, but at times they precede it, and constitute the earliest phenomena that succeed the action of the pathological cause; and, although they may be considered as resulting in the first place from the discharge of blood, and, possibly, from the formation of coagula, whose presence incommodes and irritates the womb; yet, in the second, they must be regarded as an active cause in the production of flooding.

In fact, it is impossible for any contraction to take place in the external muscular layer, without modifying the circulation in the subjacent vascular one; and hence, when the vascular plexus of this intra-uterine lamina is irregularly compressed by the muscular contractions of the organ, the blood must flow back into some part of the placental disk, thereby determining a partial congestion, which

may cause the rupture of one of these feeble venous ramifications, and, as a consequence, a sanguinous extravasation. But the influence of the spasmody action is not limited to this; for, by effecting a retraction that is confined exclusively to the segment of the uterine globe, they necessarily draw upon the placental adhesions, and may, perhaps, rupture them.

Besides these local modifications, whose power over the production of hemorrhage it is impossible to deny, there are still numerous other circumstances that we might point out, which have the same effect. But let it suffice to recall the physiological and pathological changes that gestation impresses on all the functions (which have already been studied under the titles of the *Physiology and Pathology of Pregnancy*); to recall that almost constant condition of general plethora, that habitual fullness of the pulse, flushing of the face, and increased activity of nutrition and circulation which are manifested in most plethoric women during the early months; to recall that susceptibility which the least emotion excites and irritates; that delicacy of sensation natural to most nervous females, but carried to the highest degree in pregnant ones; and, finally, to recall the fact that, during the gravid state, the uterus is, as it were, the common centre, where all the general disorder caused by any moral or physical excitement is determined. Hence, the reader will understand the reason why most authors have considered a plethoric constitution, a profuse normal menstruation, and the lymphatic temperament (which so often accompanies great nervous irritability), as predisposing causes of puerperal hemorrhage; why plethoric females are so often affected with flooding at the return of the monthly periods, since their habit determines at these times a greater activity and a more intense congestion in the womb; why the venereal excesses have often been followed by a profuse flooding, by causing a long-continued and over-excitation in all the genital organs; and, lastly, why every circumstance calculated to determine or to keep up an unusual activity in the general circulation, and particularly a more considerable afflux of fluids towards the gestatory organ, has been at all times considered as predisposing the woman to hemorrhage; such, for instance, as fatigue, the frequentation of balls, of plays, and crowded assemblies, where the air is impure and at a high temperature; prolonged watching; over-heating diet, and the use of alcoholic drinks; as well as all local irritants, such as the abuse of drastic purgatives, which, by their excessive irritation on the intestines, may react on the uterus; hip-baths, the frequent application of leeches to the vulva, the existence of any organic alteration, or an acute inflammation in the neighboring organs, or in the womb itself; because all these circumstances are calculated to maintain an habitual state of congestion about the matrix.

§ 2. DETERMINING CAUSES.

The prolonged action of the predisposing causes just enumerated may eventually produce a hemorrhage; and thus, after having acted for a long time as the predisposing, they finally become determin-

ing causes. But, in addition to these, there are some other circumstances that have been enumerated by authors, which might be designated as the *accidental determining causes*. These are so numerous and so varied that, to furnish a summary of them, it would be necessary to bring forward nearly all of the cases that have ever been published. Besides, all these causes may be referred either to the acute moral emotions, or to physical disturbances; for example, to a violent passion; the sudden arrival of some unexpected person or intelligence; a fit of anger; sharp bickerings, etc.; to the jolting of a rough carriage; to riding on horseback; a fall on the feet or nates; blows on the abdomen; efforts to carry or lift some burden; to cough, vomiting, etc. etc. etc. (*Vide art. Abortion.*)

But these causes, the list of which I might have greatly augmented, do not all have the same mode of action; for some of them (such as most of the moral ones) act primarily on the whole organism, and only react on the womb secondarily; while others, like the generality of the physical causes, are addressed, as it were, directly to the gestatory organ, and, by the shock they communicate, have a tendency to disturb the relations existing between it and the product of conception. It is generally conceded that the first determine a more considerable afflux of blood towards the uterus, then an engorgement of the utero-placental vessels, and finally the rupture of those vessels; or, if the pregnancy is but little advanced, the afflux of blood is followed by a sanguineous exhalation from the internal surface of the organ. But how, it may be asked, is the hemorrhage produced after a fall, blow, or any physical commotion whatever, especially in the latter stages of the gestation? And is the separation of the placenta, which is then a very common occurrence, the primitive phenomenon, and has it caused a vascular rupture? Or, indeed, has this rupture taken the precedence, and has the effusion of blood between the after-birth and the uterus resulting therefrom produced the separation of the placenta? The latter opinion appears to me the more probable; for, although there can be no doubt that the feeble bonds of union which attach the placenta to the uterus may be primitively lacerated, as a consequence of some very violent shock or fall from an elevated place (since, under like circumstances, the very substance of the free organs, the liver in particular, has been lacerated), yet this certainly does not happen in a large majority of cases; because the ovum forms a full sac, which is in immediate contact with the cavity that encloses it, and the placenta is sustained by the waters and the foetus within and by the uterine wall without. The container and the contained, therefore, constitute a whole, that cannot be separated by any general commotions unless they are very severe. Wherefore, so long as the membranes remain unruptured, it is difficult to conceive that the separation could be effected otherwise than by the impetus of the blood that is about being effused into the cavity of the womb.

In conclusion, although these physical and moral disturbances

are enumerated by authors as being capable of producing a hemorrhage, it must not be supposed that they constantly have this unfortunate result; indeed, their influence is far from being always in proportion to their violence and intensity. In general, they only act and are followed by flooding, because a predisposition exists in the patient which the determining cause excites and brings into play. I might mention individuals in whom the least excitement has been followed by a hemorrhage that proved fatal to the foetus, whilst others have borne the most severe moral disturbances without accident; and several cases were cited in the article on *Abortion*, which equally prove that the most violent physical shocks oftentimes give rise to no disorder whatever. We must, therefore, admit the intervention of a predisposing cause in the majority of cases; a cause which often, indeed, plays the most important part in the production of the accident.

§ 3. SPECIAL CAUSES.

Independently of the general causes just studied, there are some which might be termed the special causes, because they depend on certain peculiarities in the position and structure of the ovum; and their influence is particularly apt to be felt at an advanced stage of the gestation. We allude to an abnormal insertion of the placenta, to a rupture of the umbilical cord, and to some other peculiarities about to be mentioned.

1. *Insertion of the Placenta over the Cervix Uteri.*—Nearly all the older authors detail cases where the placenta was found attached over the neck of the womb at the time of labour. But some of them altogether misunderstood the cause of this disposition, and supposed that the placenta had been detached in totality from the point where it was originally inserted, and had fallen from mere gravity on the neck of the womb; while others, who had observed it to be still adherent by one margin to some point of the periphery of the cervix, concluded that this adhesion was only accidental and merely occasioned by the clotted blood; *which, says Deventer, sometimes glues the placenta so closely to the orifice that it might be taken for an excrescence of the part.* There were others, again, who had noted the fact with much care, without attempting to give any explanation of it; and Levret was among the first to direct attention to this important point, for he demonstrated its frequency and danger, and studied the causes and proper methods of detecting it. However, this abnormal insertion had been pointed out long before the time of Levret; for Giffart, in narrating a case of hemorrhage, wrote in 1730: “I cannot receive as absolutely true the opinion of those authors, who say that the placenta is always attached to the fundus uteri, for in this case, as in many others, I have every reason to believe that it adhered on the internal orifice, or very near to it; and that, in dilating, the latter occasioned the separation of the after-birth, and as a consequence the hemorrhage.” (*Observ.*, 115 et 116.) Heister (*Institutiones Chirurgicales*, chap. cliv. part 1) likewise says: “Some moderns think that the adhesion of the placenta over

the neck is a cause of hemorrhage; and, therefore, the more the os uteri dilates the more abundant is the flooding." As we detailed the various circumstances, when studying the anatomy of the placenta, which, according to most authors, determine the point of attachment of this vascular mass, it will be unnecessary to revert to them here.

The insertion of the placenta over the os uteri has been considered, since the days of Levret, as an inevitable cause of hemorrhage during the last three months of gestation, and in the course of the parturition. The flooding then, says Gardien, is the immediate consequence of the gestation, and particularly so of the labour. Most modern writers, supposing that the modifications occasioned by pregnancy in the disposition of the neck towards the latter months are the sole cause of the hemorrhages that then occur, have adopted the same opinion; and the following, in their view, is the mechanism whereby the discharge is produced. Up to the fifth month, the body of the womb undergoes numerous changes, but, after that period, the neck is also involved and participates therein. (Vide *Pregnancy*.) The diminution in its length is accompanied by a more considerable enlargement of its base on a level with the internal orifice. The placenta, being fixed and immovable on the spot where it is implanted, cannot follow this spreading out at the upper part of the neck, and hence the bonds of union which it has contracted with the womb necessarily become ruptured, as do also the utero-placental vessels; and this rupture produces a more or less considerable discharge.

But it is only necessary to recall what was stated in the article on *Pregnancy*, to be convinced that this explanation, which is founded on a false, though hitherto admitted fact, ought to be rejected; since it is at the lower part of the neck (at least in women who have previously borne children) that the eversion of its cavity commences; and, in all, the internal orifice often remains closed until the last few weeks of gestation. The neck, therefore, does not spread out at its superior part, and, consequently, we are not to search there for the cause that produces the hemorrhage, when the placenta is inserted over the cervix. The following explanation appears to me more plausible: During the first six months of gestation the uterus is developed at the expense of the fibres in the superior part of the body or fundus of the organ particularly; while in the last three months, the fibres appertaining to the lower third of the womb are developed in a rapid manner, and the cavity of the organ is enlarged in consequence of the distension and growth of this lower part; a proof of which is, that the body of the uterus, which was pyriform in the earlier months, is perfectly ovoidal in shape towards the close of pregnancy; and I will further remark, that the development of the placenta is far more rapid in the first six than in the last three months. Now, this double phenomenon seems to me quite sufficient to account for the production of hemorrhage; for when the placenta is attached to the fundus, its growth is simultaneous with the enlargement of that portion of the uterine walls on which

it is implanted, and there is evidently no loss of blood; but when the after-birth is inserted over the cervix uteri, or on some adjacent point, the contrary must necessarily occur, because the growth of the placenta is nearly completed, whilst a more considerable extension of the lower third of the womb has yet to take place. Of course, the placenta can no longer participate in this rapid development, by conforming to the increase of the uterus, and by following the widening of the wall on which it is inserted; and hence it spreads out from the centre towards its circumference, the fissures between the cotyledons become larger, and its different lobes are thus widely separated; but the growth of the uterus' inferior wall is so rapid, in the latter months, that this mechanical widening of the placenta, on which M. Jacquemier has particularly insisted, is no longer sufficient to prevent the tension of the utero-placental vessels, or of the cellular tissue in which they ramify; and this tension being ultimately carried to an extreme, all of these cellulo-vascular adhesions give way and become ruptured, and thus give rise to the production of hemorrhage. If this be the true explanation, there is no necessity for invoking a diminution in the length, and a spreading out in the upper part of the neck, which really does not take place. By it we can also comprehend the possibility of a circumstance that is inexplicable under the theory generally received—I allude to the hemorrhages that occur when the placenta is attached to the lower part of the womb, on some point adjacent to the internal orifice;* for it is not because the after-birth is implanted over the cervix that a flooding takes place during the latter months of pregnancy, but because it is in relation with the inferior third of the uterus.

The explanation usually given, is only true with regard to those sanguineous discharges that come on in the latter weeks of gestation or during the parturition; for then, the spreading out of the cervix uteri, and its complete effacement, must necessarily have a great influence over the production and the profuseness of the flooding, in those cases where some point of the placenta's circumference is in immediate relation with the neck; but still more especially in those where the insertion takes place, as it is said, centre for centre.

Although a hemorrhage is usually considered to be inevitable under such circumstances, yet it may not appear even during the labour; and the dilatation of the os uteri may be effected without

* It affords me pleasure to acknowledge that M. Jacquemier, in his excellent *Mémoire sur le mécanisme des Hemorragies*, has anticipated me in describing the part which the successive development of the fundus and the lower portion of the uterus performs in the production of certain hemorrhages; but, unfortunately, he does not avail himself of it to explain the flooding in the cases where the placenta is inserted over the cervix uteri; for he says, "As to the latter, the explanation given by Levret, and since adopted by nearly all observers, is perfectly correct." I believe, on the contrary, it is wholly erroneous; for whilst, according to M. Jacquemier, the tardy development of the lower portion of the uterine body can only explain the accident when the placenta is inserted in such a way that its margin is quite near to the orifice of the womb, I consider it the only cause of hemorrhage during the gestation, even when the placenta is inserted, centre for centre, directly over the internal orifice.

the loss of a drop of blood. This absence of discharge is doubtless a rare circumstance; but its authenticity at the present day is well established by numerous cases; authors only differing as to the explanation given of it. Thus, Walter supposes that in cases of this kind there is probably a larger and more easy communication between the venous and arterial radicles of the uterus than usual, whereby the blood may pass from the arteries into the veins without escaping externally; and M. Mercier imagines that the exhalant vessels of the womb are then in a state of constriction, of perversion of their sensibility, which is sufficient to retard the course of the blood; but these two explanations appear to me inadmissible. M. Moreau remarks that, in the reported cases, the children were dead, and perhaps had been so for several days; now, says he, as soon as the infant dies in the matrix, the cessation of the foetal circulation occasions changes in that of the organ; the blood being arrested in the vessels coagulates there; the latter retract, or even become obliterated, and no more blood reaches the womb than what is necessary to its nutrition, since the stimulus that heretofore determined a greater quantity to it, no longer exists; and hence the dilatation of the orifice may be effected without hemorrhage, notwithstanding the vessels are torn that united its borders to the placenta. This, in my opinion, is the more rational view.

Lastly, if the rupture of the membranes should occur at the commencement of labour, it is possible that the uterine retraction (which would naturally follow a discharge of the waters), and the compression that would be made by the head on the part left uncovered by the separation of the placenta, might entirely obliterate the lacerated vessels, and thus put an end to the hemorrhage; and yet the foetus be living.

2. *Rupture of the Cord, or one of its Vessels.*—It is now an incontrovertible fact, that a rupture of the umbilical vessels, or of the omphalo-placental trunk itself, may take place; and, inexplicable as it may seem, this can no longer be called in question, since it has been successively observed by such men as Delamotte, Levret, Baudelocque, Nægèle, etc. This rupture, and the hemorrhage to which it inevitably gives rise, may be occasioned either by some disease of the vascular tunics, by a particular arrangement of the vessels in the cord, or by a brevity of the latter, whether this be natural or dependent on the numerous turns made around the various parts of the foetus.

A. “The umbilical vessels,” says M. Velpeau, “are sometimes ruptured; I am in possession of several examples of the kind; but it is because they were previously in a diseased state.” In a case reported by M. Dencux, the blood escaped from the umbilical vein, which was varicose at several points. The subjoined curious instance, which I reported in my Inaugural Thesis, might probably be attributed to a state of disease in the ramifications of the vessels of the cord; in this case, the hemorrhage occurred between the chorion and the foetal face of the placenta, in consequence of a rupture of all the ramifications of the umbilical vessels. This case (which

I believe is unique, and hitherto but little known) has generally been misinterpreted by those who have referred to it, and I therefore feel justified in republishing it here.* I confess, that it is not

* Rocques-Marie-Joseph Herce, aged twenty-nine years, who was pregnant for the fifth time, and had advanced to the seventh month of gestation, was brought to the Hôtel-Dieu on the fifth of May, at midnight; and the midwife that accompanied her informed us that she had had sharp pains since five o'clock in the evening. The patient appeared much enfeebled; her face was pale and slightly jaundiced; and this debility had been caused, the midwife further told us, by a hemorrhage that had lasted since the fourth month of pregnancy. The flooding had considerably increased from the moment the pains began; and it was owing, added the attendant, to an implantation of the placenta over the os uteri. The patient was placed in the ward Saint-Benjamin, where we made a vaginal examination, the result of which was as follows: the os uteri was dilated to the size of a five-franc piece, and the cervix was soft, wholly effaced, and did not contract at all. The finger, having been introduced into the uterine orifice, detected a hard, resistant, ovoid body, which we recognized as the foetal head in the first position. No soft body whatever was interposed between our finger and the cranial teguments, and we concluded that, if the placenta were inserted over the neck, it was not at least by its centre. By carrying the semi-flexed finger around the internal periphery of the neck, we endeavored to ascertain whether the after-birth was not attached to one of the lips of the orifice; but as we found nothing of the kind, the error of the midwife was manifest, and though unable to determine the cause of the hemorrhage, we did not hesitate to reject her opinion. The finger being still in the orifice, we felt the womb contracting moderately, in consequence, probably, of the irritation produced by the touch. The hemorrhage was arrested, and the head engaged at the superior strait; and the patient, though feeble, still retained a sufficient degree of strength to second the efforts of nature. We thought there was nothing further to be done than to satisfy the woman about her condition, and to persuade her to aid the uterine contractions, that began to be developed quite strongly, as much as possible. In fact, the labour advanced very well, without a return of the hemorrhage, and at four o'clock in the morning she was delivered of a dead child of seven months, which was pale and colorless, but exhibited no signs of putrefaction. Its delivery was followed by the expulsion of three large clots of blood, each of which was as big as the fist; but the flooding was not again renewed; the cord was about the usual length, and there was no circulation in it; but we were not a little surprised, after having cut it, to find that it was no longer attached to the mother; but that it exhibited, on what should have been the placental extremity, a kind of membrane, in the centre of which it seemed to be implanted. The membrane was nearly as large as an ordinary placenta, and was evidently continuous with the debris of the bag of waters; and we at first supposed it to be one of those membranous placentas spoken of by authors. This view appeared the more probable, as some vessels, evidently arising from the termination of the cord, ramified in its substance. We then thought the opinion of the midwife might possibly be correct, as the want of thickness in the placenta might have prevented us from recognizing it. When we returned to the patient, at eight o'clock in the morning, we found her doing very well; but what was our astonishment, when the nurse brought forward a placenta, which the woman had expelled after our departure. Thenceforth all our suppositions were groundless, and it was necessary to resort to an examination of the pieces for a better explanation of the phenomena offered by this patient. The following was the result, as all the members of the Anatomical Society have since been enabled to verify: the uterine face of the placenta was smooth and normal; but its foetal surface was entirely deprived of the portion of chorion that ought to cover it: and it was irregular, nodulated, and clearly exhibited the anfractuosities that separate the cotyledons. It was covered over by thick clots, and the debris of the torn and separated vessels that ordinarily ramify on its surface could readily be detected; the loose extremity of some of these vessels was an inch long. By a further careful examination of that portion of

without some hesitation that I attribute the flooding in this instance to a previous disease and rupture of the umbilical vessels. For, might not such a rupture be consecutive to an effusion of blood proceeding from one of the utero-placental vessels, the ramifications of which, as elsewhere demonstrated, get beneath the membranes that cover the placenta? Which effusion would have produced a separation of the chorion, and then a rupture of the umbilical vessels. The profuseness, and the return of the hemorrhage, and the continuance of the child's life up to the commencement of the travail, would certainly be more easily explained by this latter hypothesis than by the former. An attempt has been made to misconstrue this case since its first publication; and it has been said that numerous loops of the cord probably existed, or else that some artificial tractions had been made upon it; but I can affirm that nothing of the kind took place, and that the circumstance occurred just as I have described it.

b. The abnormal distribution of the umbilical vessels, that was pointed out in the description of the cord (*vide page 197*), may also produce a hemorrhage during the parturition, that proves fatal to the foetus. The subjoined case, described by M. Benckiser as occurring at the clinique of M. Nægèle, can leave no doubt on this point.*

the pouch hanging to the cord, which we had taken for a membranous placenta, we were enabled to detect on the face that covered the after-birth, some vascular debris, which had been continuous with those observed on the foetal surface of the placental mass. The cavity of those vessels was patulous, and some were obstructed by fibrinous coagula of recent formation. The principal divisions were intact and permeable to the blood.

From that examination, we felt authorized to conclude: 1. That the placenta was not inserted over the neck; 2. That the hemorrhage was not produced by a detachment of the uterine face of the after-birth; but that it resulted from a tearing off of that portion of the bag of waters that was attached to the after-birth; that this separation was effected at first on some point of the placenta's foetal surface, then over a greater extent, and finally this mass was separated altogether from the foetal envelops; 3. That, becoming more and more considerable, this separation had produced a gradual increase of the hemorrhage; and it was only when the detachment had been completed, and the bleeding had become excessive, and all communication being interrupted between the mother and child, that the pains were manifested, and the abortion took place. This examination likewise enabled us to account for the cessation of hemorrhage from the time of the patient's arrival at the hospital, as also for the quantity of coagulated blood that escaped after the child's delivery. In fact, as soon as we touched the woman at the time of her entrance, the head began to engage in the pelvic excavation, thus acting the part of a tampon and preventing an external discharge; but the blood did not the less continue to escape and to accumulate internally, thus giving rise to the formation of coagula, and their discharge after the delivery.

* A country woman, about twenty-six years of age, was admitted into the hospital in November, 1830. Her labour commenced on the seventh of December at noon; by three o'clock, the os uteri was dilated to the extent of an inch, and the tumor formed by the bag of waters could readily be felt. While exploring with the finger, an abnormal cord, about the size of a writing quill, was detected in the substance of the membranes, which ran from behind forwards, and exhibited no pulsation. After the rupture of the bag, the waters escaped, and were followed by a few drops of blood. The head was found in

c. The brevity of the cord may prove a cause of its laceration, not only after the rupture of the membranes, but even before the commencement of the labour and the discharge of the waters; and thus produce that variety of hemorrhage which has been designated as the intra-amniotic. I repeat again, that I am unwilling to reject any fact, however extraordinary it may be, when it is advanced by experienced and conscientious observers, who declare they have

the excavation in a first position, and it then appeared that a fold of the cord had become placed between it and the right sacro-iliae symphysis: but a very feeble pulsation could be distinguished in it, and attempts to push it up were made to no purpose; and, as the labour was progressing actively, Professor Naëgèle terminated the accouchement by the forceps. When the right blade was applied, a large quantity of water mixed with blood came away; indeed, this latter fluid had not ceased to flow during the four hours that elapsed between the rupture of the sac and the termination of the travail, and the patient must have lost six or eight ounces of it; the delivery of the placenta took place half an hour afterwards. The child, though pale and colorless, still presented some evidences of life, but it died in the course of a few minutes; it weighed six pounds and a quarter. At the autopsy, the fetus exhibited the signs of anemia, and everything evinced that its death had been caused by hemorrhage. An examination of the after-birth discovered the source of the bleeding; the placenta had its usual form and texture, but the membranes were somewhat thicker and more dense, and their laceration was just sufficient to permit the child's escape; the umbilical cord was attached to the membranes at about two inches from the placental border; and, starting from this point, the vessels of the cord were no longer held together, but they separated and ramified in different directions on the membranes; and then, after these divers ramifications of the arteries and vein had run over their internal surface for a more or less considerable extent (though variable for each, from two inches up to ten), they entered the placenta, some at its centre, but the greater number by its margin.

The author of the thesis alluded to, carefully describes the course and disposition of these various branches; but, as the limits of this work do not permit me to give his description in detail, I will only quote the principal points. The first branch, arising from the division of the umbilical vein at the point of its insertion in the membranes, ran towards the right, traversed a considerable portion of their internal surface, and was ultimately prolonged to the opposite border of the placenta; the rupture of the membranes took place just in this route at its most distant point from the placenta, and this had necessarily produced a rupture of the venous trunk just described; and to it, without any doubt, must be referred the flooding that occasioned the child's death, as proved by the autopsy. The mere descent of the cord could have no influence on its death; for, in cases dependent on that cause, the opening of the dead body exhibits the symptoms of congestion. This singular circumstance might again occur, since this disposition of the vessels in the cord has already been reported quite a number of times; but it can only endanger the child when the rupture of the sac takes place in the course of one of the venous or arterial ramifications. Where the vascular trunk exists on the portion of the membranes engaged in the os uteri, as in the case under consideration, we might anticipate the consequences; but what measures should then be employed to prevent the flooding? It would appear to us advisable to retard the rupture of the membranes as much as possible, if they be still whole, and to terminate the labour immediately after their rupture. In the former case, the os uteri should be permitted to dilate sufficiently; but, in the latter, an attempt ought to be made to terminate the accouchement before the discharge has been profuse enough to cause the infant's death. These measures would evidently be more urgent if, instead of a venous trunk without pulsation, it should be an arterial one, recognizable by its throbbing, which, from its position on the membranes, was threatened with laceration.

taken every precaution to avoid all sources of error; consequently, I admit that this rupture may take place, Madame Lachapelle and Boivin, and M. Velpeau, to the contrary notwithstanding. In such cases, the rupture has doubtless been favored by an abnormal weakness in the vascular walls, and by the diminished resistance of the sheath that surrounds the vessels; but it may be more particularly attributed to the tensions on the cord itself, that are probably produced before the membranes give way, by the immoderate movements of the foetus; which movements are probably excited by the annoyance that the turns of the cord occasion it. After the discharge of the waters, and during the child's expulsion, the shortened cord becomes stretched, and its tension augments as the head approaches the vulva: when, as a general rule, its rupture alone can permit the expulsion to be effected.*

According to most accoucheurs, this unusual brevity of the cord may give rise to flooding by determining a premature detachment of the placenta. But it appears to me that such a separation can scarcely occur from a mere dragging on the cord, because, during the uterine contraction, the placenta is strongly pressed by the womb externally, and by the amniotic liquid internally, or, rather, after the escape of the waters, by the child's trunk. Now, these parts must evidently react on the fetal surface of the after-birth with all the force of impulsion communicated by the contraction; of course, the foetus can only advance, and, consequently, the cord's tension can only take place under the influence of this contraction; and I repeat that, while it lasts, the placenta is moulded on and forcibly pressed against the parts contained within the sac, and, of necessity, cannot be separated from the womb. I believe, therefore, that a separation of the placenta from a tension of the cord is almost impossible during the continuance of the contraction; but it may take place before or during the travail, and prior to the escape of the waters, if the cord be very short and the movements of the foetus are very active. As to those cases, where it is commonly said the child is born with a caul, that is, where the head pushes the membranes before it, it may happen that the tension which these latter are subjected to, being continued as far as the placenta, may occasion its premature separation and give rise to uterine hemorrhage; more particularly where this body is not attached directly to the fundus of the organ.

§ 4. THE RAPID RETRACTION OF THE UTERUS.

The sudden and rapid retraction of the womb may likewise produce a disastrous hemorrhage, by destroying the cellulo-vascular attachments of the placenta; for this retraction, which, when restricted to proper limits, is a physiological condition of labour, becomes a

* For further details relative to the rupture of the cord, see the observations of Portal, *Pratique des Accouchemens*, p. 267; Lamotte, *Traité des Accouchemens*, p. 362; Levret, *Accouchemens Laborieux*, p. 199; Baudelocque, *Recueil Periodique de la Société de Médecine de Paris*, t. iii. p. 1; Nægèle, *Annales Cliniques d'Heidelberg*, 1826; and of Busch, *Siebold's Journal*, ann. 1828.

cause of the placenta's premature separation, when it takes place too rapidly or at too early a period of the travail. This is apt to occur in cases of a dropsy of the amnios, where a large quantity of the waters escapes at once; for the uterus then passes from an enormous bulk, to a much more circumscribed volume than what comports with the dimensions of the fœtus on which it is applied. It likewise happens after the expulsion of the first child in twin pregnancies; for the retraction that follows this process may, by separating the placenta appertaining to the other twin, cause a flooding that might prove fatal to both mother and child, if a long interval elapse between the two deliveries.

As to the hemorrhages that so often complicate a rupture of the body or neck of the womb, and those which constitute the thrombus of the vulva and vagina, they have already been considered in separate articles, and we shall not again revert to them here.

ARTICLE II.

SYMPTOMS OF UTERINE HEMORRHAGE.

The symptoms of uterine hemorrhage may be subdivided into the general and local ones.

1. *General Symptoms.*—In some cases, the flooding commences in so sudden and rapid a manner that the discharge of blood is the first symptom manifested; this is more apt to occur in those instances where the hemorrhage follows the violent action of some external cause. Most generally, the woman experiences, during the few days preceding the accident, some uneasiness in her limbs, a general and unusual malaise, a sensation of weight and of numbness in the pelvis, and a dull and obscure pain in the loins, in the upper part of the thighs and groins, which is augmented by the erect position, by strainings at stool, and by the act of urinating; and, in many cases, there is a constant desire to pass the urine. In women of a sanguine temperament, these phenomena, which are characteristic of a local uterine congestion, are accompanied by the symptoms of a general plethora; that is to say, by pains in the head, vertigo, dimness of vision, flushing of the face, and by frequency and fullness of the pulse. After these general disorders have lasted some days, it is not unusual for the active movements of the fœtus to die away, and to become very feeble, or, perhaps, not at all perceptible to the patient. After the lapse of some time, varying from a few hours to several days, these precursory phenomena give way to the general symptoms of hemorrhage, which are the same as accompanies every loss of blood; namely, pallor of the skin, feebleness of the pulse, and coldness in the extremities; the intensity of which, it is needless to add, varies according to the abundance and rapidity of the flooding, the strength of the woman, etc. etc.

2. *Local Symptoms.*—With regard to the local symptoms that characterize its existence, uterine hemorrhage has been divided into

the external and the internal. The flooding is called external, when the blood flows to the exterior, and internal, when it is effused into the cavity of the organ; but we shall hereafter see that it may be both external and internal at the same time.

A. *External Flooding*.—A discharge of blood from the external parts is of itself a sufficient sign to determine the existence of hemorrhage during pregnancy or parturition; but there are certain peculiarities dependent on the various causes indicated above, that demand attention, and which will be pointed out in detail in the following article.

B. *Internal Flooding*.—An internal discharge may take place during the earlier months of pregnancy, and yet may escape detection on account of the small quantity lost; but, however inconsiderable the amount of the effused blood may be, the clot formed by its coagulation constitutes a foreign body, whose presence excites colicky gripings, and pains in the loins, and a feeling of weight about the fundament; and these symptoms obstinately persist until a miscarriage takes place. Besides which, as M. Baudelocque remarks, there are some instances where the symptoms of occult hemorrhage are either preceded, accompanied, or followed by an external discharge of blood: thus, in the former case, the blood, finding a free issue outwardly, continues to escape until its further passage is prevented by the formation of a coagulum, which forces it to accumulate internally; in the latter, the effusion of blood into the cavity constantly goes on, until it reaches the orifice of the womb by gradually separating the membranes; while, in the third case, an external discharge will accompany the occult hemorrhage whenever one part of the blood has a free issue, but the other collects in the cavity of the organ.

At an advanced stage of the gestation, when the hemorrhage is more profuse, we must add to the precursory signs before mentioned a considerable and rapid development of the belly, and a greater resistance, tension, and hardness of the uterus than usual; sometimes even it presents a very irregular form, seeming to be divided into two parts, one of which is occupied by the ovum, and the other by the effused blood; and most generally the active movements of the foetus disappear. In some few cases, a well-marked fluctuation has been detected.

Again, when the flooding is first manifested in the course of the travail, the interval of each pain is characterized by the escape of large clots of blood in greater or less profusion. This discharge of coagula can be explained by the fact that, during the interval, the child's head does not seal up the neck hermetically, and thus its orifice is left comparatively free, and the blood is permitted to escape.

Seat of the Effusion.—The point where the accumulation of blood takes place in those internal hemorrhages that come on at an advanced period of gestation must necessarily vary, according to the part of the utero-foetal vascular apparatus which has been the source of the flooding. For instance:—

1. The blood may be primarily effused between the uterine face of the placenta, and the corresponding uterine wall; as the discharge progresses, it ordinarily dissects off the placenta towards some one point of its circumference, and is then effused all around the ovum, by displacing the membranes. But it may also happen that the whole placental circumference remains adherent to the womb, whilst its central portion is entirely detached, the effusion being limited by the margins of this mass; and the hemorrhage may be copious enough in such instances to kill the patient promptly, as the case of Laforterie (whatever may be said of it) fully proves.

The reader will likewise find, in the *New Medical and Physical Journal* (1813, No. 38, p. 535), the following case, which, though less known in France than the one of Laforterie, is not the less extraordinary: "A lady, of a weakly constitution and delicate habit, was attacked in the latter months of pregnancy with a slight discharge of blood from the vagina, not amounting altogether to half an ounce, accompanied with alarming symptoms of exhaustion and debility. The os uteri was scarcely dilated to the size of a sixpence, and was in such a state of rigidity, as precluded the possibility of affording any manual assistance. The lady in consequence died; and, on examination after death, it was found that a separation of the centre of the placenta from the parietes of the uterus had taken place, whilst its edges were completely adherent, forming a kind of cul-de-sac into which blood had been poured, to the amount of a pint and a half, which had become coagulated within the cavity thus formed."

2. The blood may be effused into the proper tissue of the placenta, and thereby constitute those sanguineous collections which have been designated of latter time under the name of *placental apoplexy*. The woman's life is never compromised by a discharge of this nature, but the death of the foetus, and, as a consequence, its premature expulsion, most generally result therefrom.

3. The blood may be effused on the foetal surface of the placenta, as in the case referred to above; but the flooding here evidently must have been internal before it was external. Indeed, several observers have reported that they found coagula lying between the chorion and a portion of this foetal aspect of the placenta.

4. The numerous observations detailed in the memoir of N. C. Baudelocque, prove that blood may be effused between the various membranous laminæ that constitute the amniotic sac, at all stages of pregnancy.

5. Lastly, notwithstanding the strictures which the cases narrated by Delamotte, Levret, Nægèle, Baudelocque, and others have been subjected to, they constrain us to believe that both a partial and a complete rupture of the umbilical cord may take place; in consequence of which an effusion of blood is made into the cavity of the amnios.

ARTICLE III.

DIAGNOSIS.

A. *External Discharge.*—The difficulties hitherto described (*Vide Diagnosis of Abortion*), as complicating the diagnosis of hemorrhage during the first six months of pregnancy, are scarcely ever met with at a more advanced period. In fact, it is so rare to find women regular as late as the last three months, that every discharge of blood from the vulva at that period may be considered as a symptom that requires immediate attention; for, at the most, we could only confound a very slight hemorrhage with a return of the menstrual discharge, and, in both cases, the precautions to be taken would be the same; or, at least, if indifferent in the one, they might prove very serviceable in the other.

Where a hemorrhage does come on in the course of the last three months of gestation, or during the travail, the question arises, what is its cause? But this question, though very important both as regards the prognosis and the treatment, is sometimes exceedingly difficult to answer; although it has been shown that often, perhaps even, according to certain authors, the most often, it is owing to an insertion of the placenta either over the os uteri, or on some adjacent point; and most of them go further, and endeavor to point out the signs whereby this abnormal situation of the after-birth may be recognized.

The signs that announce the existence of this anomaly may be divided into the rational and the sensible signs. The first of which are derived from the mode of development of the accident, and its attendant circumstances; while the second are furnished by the touch.

When the flooding comes on at an advanced stage of the gestation, more particularly in a woman who has previously borne children, it is most generally possible to detect the presence of the placenta over the internal orifice by the touch. Although, says Levret, there is sometimes difficulty in finding the neck, notwithstanding it be in a measure within reach of the finger; for a great quantity of coagula, a part of which is adherent, is ordinarily found in the vagina, and their detachment augments the hemorrhage; beyond all these, a soft, fleshy, and as it were, a pulpy tumor is detected.* When the accoucheur examines this tumor with the extremity

* In general, this examination has to be made with the greatest possible care, because the separation of the clots often causes a return of the hemorrhage. Where the os uteri is not sufficiently dilated to permit the introduction of the finger without difficulty, it would be proper to wait until the discharge had continued long enough to produce its relaxation. Indeed, unless the flooding be profuse enough to render a premature labour inevitable, and unless there be an actual commencement of the travail, or the patient be very near her full term, all explorations of this kind should be suspended, and the general measures calculated to subdue the symptoms be employed instead.

of his finger, it feels as if he were touching the head of a small cauliflower, and he recognizes there the anfractuosities peculiar to the external surface of the placenta; then, by searching out the circumference of the tumor, the uterine orifice, which surrounds it towards its superior part, is made out; but all attempts to pass the finger between the tumor and the orifice will prove unsuccessful without a resort to violence, and a detachment of the tumor at the point where the index is passed up; or, if one place should happen to be free, the same would not be true around the whole periphery of the cervix.

A somewhat voluminous coagulum, situated in the os uteri, might be mistaken for the after-birth; but, by a little attention, it will generally be found that the clot is much less resistant, more friable and movable than the placental mass, which latter can scarcely be changed in position, and its parts are separated with much more difficulty. Sometimes, quite a thick layer of coagulated blood covers the external surface of the after-birth, and prevents the finger from reaching its proper tissue, though the clot can always be detached by a slight effort and the inter-cotyledon intervals be made out.

As stated above, the flooding may be dependent on an improper insertion of the placenta, and the latter be so far removed from the internal orifice that the finger, introduced into the os uteri, can only detect the naked membranes; if the patient be examined during labour, the extremity of the index should be passed over all the parts adjacent to the orifice, when the margin of the after-birth will most generally be felt, or at least, the membranes will be found thicker than common; or, still more likely, an epichorion that is softer, and of a triple or quadruple thickness, will be detected towards that side of the os uteri where the placenta is inserted.

In certain cases, the diagnosis may be further facilitated by an examination of the lower part of the uterine tumor, even where the cervix does not permit the introduction of a finger. Thus, for instance, in a woman, used in my course for the practice of the "touch," who had advanced to the fifth month of her gestation, I observed the following condition of things: All the superior part of the excavation was occupied by a thick, fleshy, and comparatively soft tumor, which was very nearly of the consistence of the uterine walls at the second or third month of gestation. Towards whatever part of the superior strait I carried the finger, it still encountered the same resistance, and I found it impossible to detect any portion of the foetus, or to perform the ballottement. From this single fact, I suspected an insertion of the placenta over the os uteri, but was unable to verify my diagnosis; though I have since ascertained that she was delivered, six weeks subsequently, in consequence of a profuse flooding.

M. Gendrin has made a similar observation; for he says that, in cases of implantation of the after-birth over the os uteri, the only unusual phenomenon that can be recognized is the absence of the ballottement.

When the hemorrhage takes place either in a woman with her first child, or at an early stage of the gestation, when, in a word,

the cervix uteri is not sufficiently dilated to permit the introduction of a finger, we might still be enabled to determine the cause of the flooding by the following signs, namely :—

1. A hemorrhage caused by the placenta's insertion over the internal orifice never occurs before the end of the sixth month ; and, very frequently, not until the last four or six weeks of gestation. Besides, it is highly probable that the period at which the flooding comes on, is usually subordinate to the greater or less extent of the placenta corresponding to the neck ; that, in cases of insertion, centre for centre, it is manifested much sooner than where only one of its margins is in apposition with the orifice. Nevertheless, there are numerous exceptions to this (as M. Nægèle considers it) nearly general rule; for, in a large number of the cases of central insertion, the hemorrhage is not developed prior to the commencement of labour.

2. It commences spontaneously, without an appreciable cause, and without any precursive phenomena; the woman being often suddenly aroused in the middle of the night by the blood escaping from the genital parts.

3. When manifested for the first time, it is generally inconsiderable in amount and soon over; but, after having disappeared altogether, it returns, sometimes in the course of a few hours, at others, not for several days; but, at each re-appearance, the discharge is a little more abundant, and lasts somewhat longer.

4. The cervix uteri (considering the period of gestation) is usually thicker, softer, and more spongy, because the placenta, by becoming fixed over this point, determines there a more considerable afflux of blood.

5. If the labour has commenced, and the membranes are still intact, the flooding constantly augments during the uterine contractions, and diminishes in the intervals. But the contrary is observed when the discharge is occasioned by a separation of the placenta attached to any other point; for then the womb, by contracting, obliterates the vessels, either by a retraction of its own proper tissue, or by the compression they are subjected to from the parts enclosed within its cavity ; but, in the case under consideration, the contractions that effect the dilatation of the cervix, destroy the vascular adhesions which unite it to the placenta, more and more, and thus multiply the sources of hemorrhage. This sign is one of great value before the membranes are ruptured; but, after the waters are discharged, the child's head presses on the orifice during the contraction, and prevents the blood from escaping.

6. The bag of waters does not form as in an ordinary labour; for the insertion of the placenta over the neck closes its orifice, and prevents the lower segment of the ovum from engaging therein, and from being accessible to the finger.

7. Lastly, according to Dewees, the blood has a brighter color at the onset of the hemorrhage than when it comes from the fundus, and coagula never come away, excepting when the discharge has lasted for some time, or is on the point of disappearing.

In the case I have reported, where the flooding was produced by a rupture of the umbilical vessels, and this latter accident caused by a separation of the chorion from the foetal surface of the placenta, the symptoms were very similar to those which accompany a hemorrhage dependent upon the placenta's insertion over the os uteri. Thus, the discharge commenced towards the middle of pregnancy, was several times renewed at irregular intervals, and always in increasing abundance; and it was manifested anew at the onset of labour. The vaginal examination could alone determine the diagnosis, by enabling us to ascertain the absence of the placenta from the internal orifice.

Finally, in the case detailed by Benckiser, there was something like a cord that crossed the opening in the neck at an acute angle, and this was detected before the rupture of the membranes. This cord was devoid of pulsations, but it certainly would have exhibited them if, instead of a venous branch, it had been one of the ramifications of the umbilical arteries. Should another case of the kind be met with, the presence of such a vascular trunk on the membranes ought to receive attention, and arouse a suspicion of the possibility of a hemorrhage from its rupture.

B. Internal Discharge.—The diagnosis of the internal hemorrhages becomes more easy as the gestation advances. The general phenomena that accompany all profuse discharges would first attract attention; while the unusual and rapid development of the abdomen, and occasionally its irregular form, would confirm the surmise. The hemorrhage can always be recognized whenever it is abundant enough to endanger the mother; though it must be acknowledged that a quantity of blood may be effused between the womb and the placenta, which may effect nearly an entire separation of the latter, or destroy the child, without giving rise to any other phenomena than a manifestation of the travail.

A great enlargement of the belly is a sign of the first importance; but it must not be forgotten that this may be occasioned by an entirely different cause. Thus, for instance, a tympanitis of the abdomen or a dropsy of the amnios may give rise to it: however, the sonoriety in the former case, and the slowness of the ventral development in the latter, conjoined with the absence of any general phenomena, will always prove sufficient to avoid an error. Again, the patient may be affected with a syncope during the travail that is wholly foreign to any discharge of blood; but then the size of the abdomen will not increase.

On the whole, therefore, the general phenomena that accompany all losses of blood, and a rapid augmentation of the belly, are the two characteristic signs of internal hemorrhage, whether it occurs in the latter stages of pregnancy or during the parturition.

Nevertheless, M. Heming has observed that, under certain circumstances, the abdominal swelling may be altogether wanting, and yet the syncope be dependent on an internal discharge. Thus, he says, the patient is taken at first with violent uterine pains, that reappear at certain intervals, and each one of which is followed by a slight

issue of blood from the vulva; then, at a moment when least expected, the symptoms of a most alarming syncope come on, though but little blood can be found upon the cloths, and the uterus is scarcely distended. But, by making a careful examination, the accoucheur will find, that although this organ may enclose but an inconsiderable coagulum, and although the blood does not escape freely to the exterior, yet it is because the vagina is distended by an enormous clot as big as a child's head. I deem it necessary, he adds, to insist on the presence of uterine pains, in these cases of *intra-vaginal* hemorrhage; for they are generally regarded as an evidence that nothing is to be feared from the discharge, whilst, in reality, they are often a distinctive character of the hemorrhage in question. Again, during the travail, the internal discharge is frequently followed by a diminution or even a suspension of the labour pains. The abdomen sometimes becomes tender (Levret), and a dull fluctuation may be detected there. (*Leroux.*)

ARTICLE IV.

PROGNOSIS.

As a general rule, the prognosis of uterine hemorrhage is unfavorable; though, perhaps, in a single instance, the discharge that occurs in a pregnant female may prove advantageous—it is where the patient is harassed by all the symptoms of a general or local plethora, and a moderate discharge takes place that relieves her of the surplus that gave rise to all these symptoms. But as we cannot always moderate a flooding at will that has already commenced, it would be better both to relieve the patient and to prevent the menorrhagia by resorting to venesection.

The gravity of the prognosis depends very much on the amount of the discharge, and the period at which the hemorrhage takes place, being always so much the more dangerous both for the mother and child as the blood escapes in larger quantities. Other things being equal, the infant's existence will be more seriously compromised when the flooding comes on at an early stage of gestation; that of the mother, on the contrary, will be the more endangered when it occurs nearer the term of pregnancy.

During childbirth, this accident will be more serious both for the mother and child when it is manifested at an early stage of the process; and it will be still more dangerous in a primiparous woman than in one who has previously borne children. For it must be evident that, if the flooding should occur at the commencement of labour, that is, long before the dilatation of the os uteri is effected, and before the external parts of generation are suitably prepared for the free and easy passage of the foetus, the means adequate to, and calculated for, the termination of the accouchement, will be of much more difficult application, and more delayed; and, consequently, a larger quantity of blood might escape.

As regards the cause that produces the hemorrhage, that variety which is dependent on an implantation of the placenta over the os uteri is the most grave of all: To the mother, because it is renewed several times during the latter months of her gestation in a constantly increasing abundance, and because, being always present during the travail, it frequently requires the intervention of art; to the child, because such an intervention is not without danger to it, and the interruption of the utero-placental circulation, resulting from the detachment of the placenta, produces an asphyxia that oftentimes proves speedily fatal.* Again, were the placenta inserted over the neck, centre for centre, the hemorrhage would evidently be much more abundant than in the cases where it is only in contact with the orifice by one portion of its circumference;† for if the placenta be situated in the vicinity of the neck, the discharge

* The fetus then dies by asphyxia and not by hemorrhage, as it has been asserted, and again repeated, in the recent work of M. Gendrin. For the fetus can only lose its blood when the source of the hemorrhage is in a lesion of the umbilical vessels; while, in a case of simple detachment of the uterine surface of the placenta, the child only dies because the circulation is interrupted in the utero-placental vessels, and its respiration can no longer take place. (*Vide Functions of the Fetus.*) The blood, being shut up in the umbilical vessels, cannot come any more into the usual mediate contact with the maternal blood, and the infant is then in the same condition as an adult deprived of respirable air, and like him must die asphyxiated. Besides, the autopsical examination in such cases exhibits the anatomo-pathological characters of asphyxia.

† Where the placenta is attached centre for centre, the gradual dilatation of the os uteri may effect its complete detachment long before the expulsion of the fetus. This accident, which certainly might be attended with very serious consequences, has, however, occurred without giving rise to a very profuse flooding. Chapman relates an instance in which the after-birth was thus expelled four hours in advance of the child; and Perfect furnishes a very similar case. (*Cases*, vol. ii. page 288.)

"I was once consulted," says Merriman, "by a very careful and judicious practitioner respecting a woman, who, when I first saw her, was rapidly sinking under puerperal fever. In this case, the placenta was expelled many hours before the child was born, and no extraordinary means were used to expedite the delivery of the child; a physician-accoucheur, who was consulted on the occasion, having deemed it more prudent to leave the case to nature. The fatal event, however, would lead one to doubt whether it was wise, under such circumstances, to decline the interference of art." (*Synopsis*, page 126.)

Smellie has reported three cases of the same kind; Lamotte, three (*Obs.* 321, 322, 323); Lee, three (*Med. Gaz.*, 1839); Ramsbotham, Sr., five (*Practical Obs.*, Case 153); Baudelocque and Barlow, each one; and Doctor Collins (*Practical Treatise*, page 91) narrates an instance in which the placenta was expelled about eighteen hours before the fetus; the membranes were ruptured, and the waters escaped two weeks before the entrance of the patient into the hospital; from that time until the eve of her admission, the flooding had continued with more or less abundance. This patient recovered perfectly, and left the hospital on the thirteenth day.

There are some rare cases reported, in which the child's head, being forcibly urged on by the powerful contractions of the womb, has perforated the placenta near the middle, and thus opened for itself a passage through this central perforation. This occurred in Portal's twenty-ninth observation; and W. White reports that, in a case where the placenta appeared to be inserted over the os uteri, centre for centre, the patient suffered two or three very intense pains, during which the head perforated the after-birth and was delivered. The child was stillborn, but the woman recovered.

might not appear during the travail, although it had occurred several times in the latter months of pregnancy.

As a general rule, the internal hemorrhages are more unfavorable than the external, because they often take place imperceptibly in the commencement of gestation, and thus destroy the foetus; while, at a more advanced period, they compromise the mother's life, before having given rise to any symptom whereby their existence could be positively recognized, so that the accident is often detected too late to be remedied.

Where the blood collects in the uterine cavity, the accumulation cannot take place without detaching a new portion of the placenta, and this secondary separation becomes a fresh source of vascular rupture, and, as a consequence, augments the chances of flooding. For even supposing the hemorrhage were arrested, whether spontaneously or under the influence of the measures employed, there does not the less remain a voluminous coagulum in the uterus, a veritable foreign body, whose presence will irritate its walls, will determine there a more considerable sanguineous fluxion, and will excite premature contractions, and thus become perhaps the cause of another discharge.

Again, during the parturition, the internal hemorrhage is less to be feared before than after the membranes are ruptured; because, in the former case, the womb, being already occupied by the amniotic liquid, will yield less readily to a new distension, and, consequently, will prevent a great effusion of blood. Yet more, the integrity of the membranes will admit of their artificial rupture, which, by the salutary retraction that follows it, is one of the most valuable resources of our art in these unfortunate cases; and which, it is unnecessary to add, we are deprived of when the waters escape prematurely.

But the dangers that threaten the woman pending the duration of the hemorrhage, are not the only ones to be dreaded; for her constitution and health may be broken down for a long time by these grave accidents. For even when the patients have the good fortune to escape with their lives, they ordinarily suffer for a considerable period; they are tormented with habitual disorders in the head; their digestion is painful, and their vision and hearing are defective;* and there are often wandering pains in the limbs, tremblings, etc. etc.

Where the floodings take place during the gravid state, the debility thereby caused to the mother is often reflected on the child, and, in consequence, this latter is ordinarily small and feeble at the time of its birth. Most usually the labour is lingering, the pains are short and distant, and an inertia of the uterus results from this general weakness. Those females who have been afflicted with profuse hemorrhages are far more disposed than others, during the

* In a case reported by Ingleby, the patient became suddenly blind; for five days she could not distinguish anything at all, and her sight was not perfectly restored till six months afterwards.

lying-in, to acute inflammations, and to peritonitis especially ; which inflammations then advance the more rapidly to a fatal termination, because the general condition of the patient does not permit an active resort to the antiphlogistic treatment.

The cephalalgia noticed by all observers, and which I have frequently had opportunities of verifying myself, only disappears after a very long time, and not until the reparation of the blood, and the re-establishment of the strength, have taken place. M. Baudelocque supposes that the pain is particularly apt to be seated in the hinder part of the head. Leroux attributes this affection to a diminution in the quantity of blood contained in the vessels of the brain, and to the retraction of the vessels themselves, which occurs as an immediate consequence. I would rather explain it like Baudelocque, by the direct influence which the loss of blood must exercise over the nervous system.

The child's death does not necessarily result from the hemorrhage; for, where the latter is inconsiderable, the gestation continues on its regular course. The loss of blood has even been carried to an extent calculated to inspire just fears for the mother's life, and yet an abortion has not taken place.

How then is the bleeding arrested ? The mode of termination varies somewhat, according to the cause that has determined the accident. Thus, when the flooding has been preceded by general plethora, or by a uterine congestion, it may happen that the escape of blood obviates this condition, and thus remedies the symptoms itself ; and this must nearly always be the case, where the discharge resulted from a sanguineous exhalation. But where there is a rupture of one of the utero-placental vessels, it is possible that the flow of blood, by relieving their distension, will permit these vessels to become flattened down and depressed from the double pressure of the ovum and womb, and then the hemorrhage is arrested. Again, where the placenta has been detached from the womb to a moderate extent, the bleeding can only be checked by the formation of a coagulum, which creates an obstacle to the ulterior issue of the blood, by being placed between the uterus and the placenta ; for, "while the blood is endeavoring to glide towards the os uteri," says M. Velpeau, "a more or less extensive portion of the placental mass becomes fully saturated with it: first one clot forms, then a second, then a third, and these several layers, of various thickness, soon become sufficiently numerous, provided the energy of the hemorrhagic affluxion becomes diminished, to exert such a degree of pressure as to retain the blood within its own vessels." All the vascular tubes corresponding to the point where this coagulum is formed, are thenceforth rendered useless to the utero-placental circulation, which can only be kept up through those that have not been lacerated.

The authors of the *Dictionnaire de Médecine* (art. *Hemorragie Uterine*) seem to admit, from a case reported by Noorthwick, that the detached portion of placenta may contract new adhesions with the uterine wall; but from what has just been said respecting the formation of the coagulum, which, by its presence, puts an end to

the symptoms, it is impossible to admit that this re-attachment can take place without the intervention of a fibrinous clot, which evidently precludes the re-establishment of the circulatory relations. Besides, this matter is satisfactorily proved at the time of labour; for, by examining the uterine surface of the placenta, we can then detect one or more fibrinous laminæ of a variable size, and differing from each other in the degree of degeneration, according to the period at which the separation was effected; in addition to which, the portion of placenta that had been detached is often atrophied and deprived of juices; in a word, the corresponding placental cotyledons have withered away completely.

ARTICLE V.

TREATMENT.

The management of the uterine hemorrhages may be subdivided into the preventive and the curative treatment. The prophylactic measures are as numerous as the predisposing causes, and they consist in preventing the action of those causes; and hence, to furnish a detailed account of them, it would be necessary to enter into a series of repetitions. Besides, they are included in the hygienic and general therapeutic management of pregnancy, and, therefore, we need not dwell further upon them here. But if, notwithstanding all the preventive means employed, or if, from the influence of any unforeseen causes, a hemorrhage is developed, what course shall we adopt to subdue it? The frequency of this accident, and its great danger in many cases, have at all times claimed the attention of practitioners; and, with a view of facilitating the study of the numerous measures that have been recommended, we shall divide them into the general and the special ones. The first, being applicable in all cases, are nearly always the same; but the second vary according to whether the flooding takes place in the course of the gestation or during parturition, and according to the abundance or the trifling character of the discharge.

§ 1. GENERAL THERAPEUTIC MEASURES.

Whenever an accoucheur is summoned to a pregnant woman who is affected with flooding, he should immediately attend to certain precautions that we are about to point out, namely:—

The woman ought to be kept in a horizontal position, care being taken to have the pelvis elevated somewhat higher than the rest of the trunk. All feather beds must be proscribed, and, whenever possible, she should lie on a hair mattress that is rather hard. The bed is to be placed in a large, well-ventilated chamber, so that he can easily pass around it; in the summer season, the room might even be sprinkled; and the woman is to be lightly covered. It is desirable to have the chamber somewhat darkened, and the attendants should be advised to discharge their respective duties without making any

unnecessary noise. He should endeavor to satisfy the patient as to her condition, and to remove all sources of vexation and opposition, whatever they may be; for calmness of mind is not less essential than rest of the body; more particularly, when the discharge has been occasioned by any violent passions or acute moral affections.

Cold drinks, that are slightly acidulated with vinegar, gooseberry, or lemon syrup, or even with lime or orange juice, are the most suitable. We should endeavor to obviate the strainings the patient might make on the close stool, because they might possibly increase the flooding; for this purpose, the bowels are to be kept free by injections, or, if these are not sufficient to remedy the constipation, by mild laxatives; and, lastly, if the woman has the least difficulty in urinating, it would likewise be necessary to empty the bladder by the catheter.

§ 2. SPECIAL THERAPEUTIC MEASURES.

These vary, as stated, according to the abundance or trifling character of the discharge, and according to whether this latter is manifested in the course of the gestation, or during the travail. We shall first examine them during pregnancy.

A. *Moderate Hemorrhage, occurring in the last three months.*—If the flooding has been preceded by the general phenomena of plethora, and if at the time when the woman is examined the pulse be found full, strong, and developed, the face flushed, etc., in a word, if the hemorrhage appears to be owing to, or kept up by, the plenitude or morbid action of the vessels, it is necessary to have recourse to general venesection, which will act both as a revulsive and as an antiphlogistic; but this measure is only recommended in those cases where the travail has not yet commenced, and where the discharge is inconsiderable, and has lasted but a short time. For blood-letting must be proscribed under the opposite circumstances, as also in those instances where the flooding is not associated with plethora.

When the hemorrhage is not very abundant, and, as a consequence, there is some reason to hope that the pregnancy will continue on its regular course, the opiates may be administered; they might be given by the mouth, but it is much better, in general, to exhibit them by injection, in the dose of twenty drops of Sydenham's laudanum, diffused in a small quantity of some mucilaginous vehicle; and this may be repeated three or four times, at intervals of an hour or more, where the first have not been sufficient to arrest the symptoms. A long experience, says Burns, enables me to recommend this measure in all cases where blood-letting is not practicable. For the first twenty-four hours, the patient must be subjected to a strict regimen.

Such are the measures to be employed in cases of moderate hemorrhage occurring in the last three months of gestation; and they should be continued until it has entirely disappeared.

After the symptoms are wholly subdued, the woman ought to take the greatest precautions to avoid a relapse, by keeping in bed for a

week at least, eating but little, and that of non-succulent articles, especially if the discharge had been attributed to plethora, etc. etc.

B. *Profuse Hemorrhage occurring in the last three months.*—Where the flooding is more abundant, the remedies to be employed are also more active; and, to the measures already enumerated, except venesection, which, as before stated, must be rejected when the discharge is very profuse, we may now add:—

1. The application of compresses, steeped in some very cold liquid, to the upper part of the thighs, hypogastrium, or loins (in one instance, M. Gendrin successfully administered an opiate injection at the temperature of melting ice); and, where the heat is increased, cold sponging over the legs, arms, and even the trunk. But the action of cold is not to be resorted to without discrimination; nor, as a general rule, should it be kept up for a very long time; because, although its application may be useful at the commencement of the attack, when the phenomena of local congestion are manifest, yet it would certainly prove injurious if a very copious and persistent flooding had already enfeebled the patient; and if there was reason to fear the powers of life were giving way and the woman was sinking into a state of complete prostration.

When the skin is cold, or the pulse small and feeble, the refrigerants are not indicated, and they should be suspended at once, if in previous use.

2. In this latter case, if the flooding continued and her prostration augmented, it would be necessary to have recourse to revulsives applied to the superior parts. I have seen, says M. Baude-locque, a profuse hemorrhage suspended almost instantaneously by placing the hands in very hot water.

Under the title of revulsives it has been recommended, since the days of Hippocrates, to apply cups either above or just under the breasts, and between the shoulders.

M. Velpeau advises the employment of a sinapism at the upper part of the back; for he has found this remedy beneficial in a great number of instances, and at all stages of gestation; "nevertheless," he says himself, "there would be little wisdom in relying upon it to completely suppress a hemorrhagy that had already become serious and alarming." It is, however, an auxiliary measure that should never be neglected, for it can have no disastrous tendency; but, in my opinion, the same cannot be said of revulsives applied to the breasts, since it is by no means certain that they may not prove injurious. Indeed, many authors, relying on the sympathy that exists between the uterus and the mammae, have supposed that every stimulant applied to the latter must excite the action of the former, and, consequently, tend to renew, or to keep up, the hemorrhage.

3. If the measures hitherto enumerated be not sufficient to arrest the flooding, the ergot might be exhibited in the dose of half a drachm divided into three parts, one of which is to be taken every ten minutes. This medicine, which is recommended by M. P. Dubois under such circumstances, appears to him to have nothing

more than an hemostatic action ; "for, if it be objected," says he, "that this remedy might determine the uterine contractions, and thus provoke a premature labour, we answer that, up to the present time, not a single well-founded observation proves that the spurred rye has the property of *provoking* the uterine contractions ; though, where these exist already, it increases them, or restores them when suspended ; but it does not cause them to arise if the uterus is in a state of perfect rest. On the other hand, even supposing that it had this virtue, that would not be a just ground of exclusion, for it must not be forgotten that the question is before us of arresting a serious accident, one which cannot exist without prejudice to both mother and child ; and that the only other resource is the use of the tampon, which, even more than the ergot, would expose her to the hazard of an accouchement before term." (*Journ. de Méd. et de Chir. Pratique*, 1836.)

4. But it sometimes happens that, notwithstanding the employment of refrigerants and the ergot, the flooding continues, the woman becomes pale and colorless, the pulse is small and thread-like, and she has vertigos, etc. ; and the violence of these symptoms endangers the lives of both mother and child. Under these grave conditions, the accoucheur has only to choose between an application of the tampon and a provocation of the labour by rupturing the membranes.

A. *Use of the Tampon.*—When speaking of the natural termination of those hemorrhages that come on during pregnancy, we stated that the discharge was arrested in consequence of the formation of coagula, which, by becoming applied over the orifices of the vessels, perhaps even by being continued into these orifices, prevented a subsequent discharge of blood ; and that it is on the formation of these salutary coagula that we must found our hope, so long as there is a chance of preserving the infant. It was with this view that the older physicians resorted to the use of astringent injections, and more especially to pessaries made of some old linen saturated with such liquids. But they did not depend upon the coagulating and astringent properties of these substances alone ; but also relied on their mechanical effect in retaining the blood. For this purpose, therefore, Leroux of Dijon, proposed his tampon in 1776. This remedy, says he, is exceedingly simple ; it consists in the creation of an obstacle to the escape of the blood by filling up the vagina with balls of linen or tow, saturated with pure vinegar. Desormeaux thought it was better to first double a large piece of fine linen, and then carry up the fold to the fundus of the vagina ; and afterwards to fill the pocket, thus formed by the linen, with bits of charpie, or tow, or any other soft substance that may be at hand. M. Moreau condemns this procedure, because, he remarks, it is difficult and painful, and it would be almost impossible not to leave some space between the tampon, and the cervix uteri. He recommends the mode of application to be altered to suit the particular case : for instance, if the os uteri is a little dilated, he advises the use of a roller, which is wound tightly in the form of a cone, and well fast-

ened; and then the conical extremity of this plug is introduced into the uterine orifice itself, and is retained there by the finger. When the dilatation is somewhat more advanced, he makes use of a lemon, having the rind pared off at one extremity, and he introduces this into the neck of the womb, where its bulk obliterates the orifice, and its juice irritates the organ ; and lastly, when the os uteri is freely dilated, he recommends the vagina to be crammed with lint steeped in vinegar, and the whole to be secured with a T bandage. Leroux was also in the habit of saturating the tampon with vinegar. The astringents were considered useless by Desormeaux ; for, he says, it is only on the mechanical action of the tampon that we can rely, and not upon the irritation which its contact, and that of the acids with which some persons saturate it, may produce on the uterine wall. It would be very fortunate, indeed, if the tampon never acted, save by preventing the issue of the blood, and by determining its coagulation ; for then, in arresting the hemorrhage, we might preserve the life of the foetus much oftener than is now done. But unhappily, it has yet another effect, that is, it frequently irritates the organ by mere presence, and by forcing the blood to coagulate in the uterine cavity, whereby a more or less voluminous coagulum is formed there, which further adds to the irritation produced by the tampon itself ; the contractions are developed, and, in most cases, the womb soon drives out the tampon, coagulated blood, and foetus altogether. This, we may observe in passing, is the most serious objection that can be urged against the use of the tampon, a reproach that it often merits, and more particularly when it is saturated with vinegar.

But, after all, notwithstanding these disadvantages, the tampon is a remedy that cannot be dispensed with in practice ; and we do not know how to better describe the cases in which it may be resorted to with advantage, than by furnishing the following extract from the memoir published by Gardien, in the ninth volume of Leroux, Boyer, and Corvisart's Journal.

The tampon may be applied : 1. To arrest any hemorrhage that might arise from the rupture of a varix on the uterine neck, or in the vagina ; 2. In a case of laceration, occurring at the orifice of the womb during labour, and when there is any inertia, by a direct application to the torn surface ; 3. In cases where the placenta is inserted over the os uteri centre for centre : the blood, being retained by the tampon, forms a coagulum which is compressed between it and the after-birth, whereby the serous part is expressed, and a concretion takes place which contracts adhesions with the adjacent parts, and suspends the discharge until the rupture of some other vessel renews the hemorrhage. However, if the true pains were manifested, its employment would be almost useless, perhaps injurious, by acting as an irritant in augmenting the uterine contractions. Nothing is to be feared in these cases from an internal bleeding ; for, although we have quoted some examples of the kind, these are so rare that they cannot counterbalance all the advantages of the tampon ; besides, the mere fact of its employment does not dis-

pense with the necessity of carefully watching the patient ; 4. It is likewise serviceable in those floodings that accompany the abortions, which take place in the course of the first three months, whether before or after the delivery of the after-birth : before, because Puzos' method might render this delivery impossible, or at least, very difficult ; and after, because there would be no cause to fear an internal hemorrhage, for the reasons before given ; 5. It might answer in those instances where there is no dilatation of the os uteri, or when this is impossible, and consequently where it would be impracticable to pierce the membranes ; 6. And lastly, where the flooding continues after the membranes have been punctured, and it is impossible to effect a forced delivery ; as in the cases reported by Lamotte and Smellie. Nevertheless, its employment then should always be watched over with the greatest possible attention ; for the uterus, in which a void is created after the discharge of the waters, is susceptible of becoming distended, and an internal hemorrhage might take place. Under such circumstances, an artificial delivery must be resorted to.

But the tampon should be rejected : 1, whenever we might reasonably hope to prevent an abortion ; for even Leroux himself made use of the ordinary means before resorting to this measure ; because, by retaining the blood that should escape within the womb, it distends this organ by forming a coagulum, which may augment the detachment of the membranes and placenta, and may likewise irritate the matrix by its presence, and thus bring on the contractions ; and, 2, whenever (as hitherto stated) the placenta is inserted over the os uteri, and the labour has commenced.

B. *Rupture of the Membranes.*—When the hemorrhage is profuse, and has made its appearance during the latter months of gestation, more particularly if a commencement of the labour has already taken place, a rupture of the membranes should generally be preferred to the use of the tampon. Because the child's life is then almost as precious as the mother's, and we must endeavor to remove it from the threatened danger. It was with this view that our predecessors resorted to an artificial labour under such circumstances. But Puzos has proposed a measure which conjoins the advantages of the natural accouchement with those of a forced delivery. It is necessary for that purpose, he says, to introduce one or more fingers into the uterine orifice, by which an attempt is made to dilate it with a degree of force proportioned to its resistance ; this gradual dilatation, which is interrupted by intervals of rest from time to time, excites the pains ; the womb contracts, and during its contraction the membranes become tense, and engage a little at the upper part of the cervix, and these latter are ruptured as soon as possible, in order to effect a discharge of the waters. The presenting part, particularly if this happens to be the head, should be carefully pressed up by the finger for some moments, so as to permit the liquid to escape. The objects to be accomplished are obviously to encourage a discharge of the waters, to arouse the contractility of the uterine tissue by this evacuation, and to solicit its retraction ; whereby the

vessels situated in the thickness of its walls would undergo certain modifications favorable to an arrest of the hemorrhage. Further, when the retracted matrix is compressed on the child's trunk, and some portions of this latter are forcibly applied against the patulous vessels that furnish the blood, the compression thereby produced must evidently arrest the flooding.

This method, which has been adopted by Dr. Rigby, of England, has been severely criticised by his countryman, Duncan Steward, who endeavors to support his own opinion by the following observations: by rupturing the membranes before the uterus is dilated, we retard rather than accelerate the expulsion of the infant; and, besides, it is by no means certain, as experience has demonstrated, that this measure will arrest the hemorrhage; while it often diminishes the chance of saving the life of the mother and child, by rendering the version much more difficult, if this operation should subsequently become necessary.

Notwithstanding these objections, which, after all, have no great force, the rupture of the membranes is advocated by most of the teachers of the present day, in cases of profuse flooding, occurring at an advanced stage of gestation. Nearly all teach, however, that a regular commencement of the travail, manifested by evident uterine contractions, should precede its performance; but, as M. P. Dubois remarks, it is important to bear in mind that, when a considerable discharge takes place, the contractions of the womb are often feeble, and that the travail may actually be progressing though the pains have not clearly marked its onset; while, on the other hand, the discharge of a large quantity of blood and the escape of voluminous coagula, both relax and dilate the uterine orifice; and these circumstances, which are doubtless joined to some non-painful contractions, may dilate the os uteri, without the knowledge of the patient or the suspicion of the accoucheur. This phenomenon is not at all unusual, especially in women who have previously borne children; and, therefore, whatever be the condition of the body of the uterus, and whether there be any apparent contractions or not, he should carefully ascertain the state of the os uteri. In cases of profuse flooding, this will most frequently be found sufficiently dilated to permit the introduction of a finger, at least; and the membranes will then be felt tense and protruding at intervals; which protrusion is a certain proof that the matrix begins to contract, and the rupture of the membranes will then be effected to the greatest advantage. Besides, this operation does not exclude the employment of the various stimulants calculated to excite the contractions; thus abdominal frictions might be resorted to, and the finger, when introduced into the neck, should first titillate and irritate this part before making the rupture; and it would even be prudent to administer two or three doses of ergot to the patient, provided the neck is softened, and it seems to offer no marked resistance to the dilatation.

Most accoucheurs advise the application of the tampon, when the discharge is produced by an insertion of the placenta over the cervix; but M. P. Dubois teaches that the course to be pursued in such

cases will vary according to the degree of this insertion. For instance, where it takes place centre for centre, or in other words, when the placenta covers all the superior part of the internal orifice, and the membranes are inaccessible, or can only be reached by detaching some portion of the placental circumference which is still adherent, we should have recourse to the tampon; but where the placenta corresponds to the orifice by only one of its borders, and particularly where it is inserted at some point adjacent to this orifice, he likewise recommends an artificial rupture of the membranes; being satisfied that, after the waters have escaped, the child's head, by becoming applied on the detached portion of the placenta, will, by this compression, put an end to the flow of blood.

Quite recently, M. Gendrin has entertained the idea of adopting Puzos' method, even in those cases where the after-birth corresponds to the os uteri centre for centre. In a very similar instance, Rigby had deemed it advisable to push his finger through the centre of the placenta, and thus pass it directly into the amniotic cavity. The following are the observations of M. Gendrin on this subject: The authors, he says, have advised the travail to be induced by direct manipulations, which consist in forcing the dilatation of the os uteri and passing into the matrix through the placenta, or by detaching this organ from one portion of the neck; but these manœuvres occupy much time, and besides are very difficult, and, if the blood continues to flow, the enfeebled patient may become prostrated. We propose instead the following process, which has the great advantage of keeping up the relation between the after-birth and the uterus, as long as possible. It consists in evacuating the waters, by making a puncture with a female catheter, which is directed along the finger previously introduced into the os uteri, and is passed into the membranes through that portion of the placenta lying over the neck. In the two cases where he adopted this plan, the hemorrhage disappeared immediately; and this measure may, therefore, be employed, when the amount of the discharge indicates a resort to the method of Puzos, and when the presence of the placenta is the only obstacle.

Internal Hemorrhage.—We can only expect to overcome those internal discharges that are serious enough to compromise the mother's life, by emptying the matrix and terminating the labour. Two different conditions may then be met with, viz., one, where the travail has not yet commenced, the neck is still undilated, and its margins are hard and thick; in the other, on the contrary, there are some labour pains, the cervix is softened, and is more or less dilated. In the latter case, the indications for treatment are obvious; that is, to rupture the membranes by employing all the various measures which are calculated to bring on the contractions (such as abdominal frictions, titillations of the orifice, and ergot), and to watch the state of the womb after this rupture attentively. Such is the course to be pursued where the dilatation is inconsiderable; but, on the other hand, when the os uteri is either dilated or dilatable, the accouchement should be effected at once by the version, or by an application of the forceps, according to circumstances (*vide Version*, and *art.*

Forceps). But where the symptoms occur some time before the full term of gestation, particularly in a woman with her first child, the complete obliteration of the cervix may constitute an insurmountable obstacle to the introduction of the smallest instrument. In these grave cases, after having employed the usual means to moderate the effusion of blood without benefit, such as irritations made on the neck and over the fundus of the womb, with a view of bringing on its contractions ; and if the woman becomes weaker and weaker, and is threatened with an absolute prostration, it will even be requisite to have recourse to a forced introduction of the hand. Generally speaking, the slightest efforts will be sufficient to overcome the resistance; since it is scarcely possible for a considerable effusion of blood to take place in the cavity of the uterus, without causing a development of some pains, or at least, a marked diminution in the resistance of the cervix. But if it should unfortunately happen that this resistance cannot be surmounted, I think that repeated incisions ought to be made on the neck itself. Though if the symptoms were not very urgent, it would be better perhaps to have recourse to a general abdominal compression, which would prevent the womb from becoming enormously distended ; because this procedure has so often appeared successful, that its employment under like circumstances would be justifiable.

c. *Moderate Hemorrhage during Labour.*—When the flooding is manifested during the parturition, the indications it presents likewise vary according to the intensity of the symptoms and the degree of dilatation in the os uteri. For instance, where the blood escapes in small quantities, and the accoucheur is satisfied that it does not accumulate within the organ, he will employ here the same means as were recommended for the slight hemorrhages occurring in the latter stages of gestation ; except the blood-letting, which should only be practiced when evident phenomena of plethora exist, and also excepting the opium, which would here be attended with the serious inconvenience of suspending the uterine contractions. These general measures will usually prove sufficient where the neck is but little dilated, and the discharge is inconsiderable.

But, should the cervix be freely opened, or be so softened as to offer no resistance, we might rupture the membranes, if they are yet intact ; and if the flooding still continued after this rupture, the labour lingered, and the pains, though at first energetic, became gradually more enfeebled, and the intervals between them longer, they should be aroused by the administration of ergot.

d. *Profuse Hemorrhage during Labour.*—Whether the hemorrhage be internal or external at the time of labour, it always offers the same indications for treatment ; and these latter are also based on the variable degree of dilatation in the uterine neck. For, if this is but little advanced, that is, if the cervix be neither dilated nor dilatable, the remedies we have advised for the profuse hemorrhages occurring in the latter months of pregnancy should again be brought into service ; that is, the refrigerants, the ergot, and a rupture of the membranes, if still intact. Should the flooding continue after the rup-

ture, and the retraction of the os uteri render an introduction of the hand absolutely impossible, the tampon should be applied at once; and the precaution be taken to make compression over the anterior abdominal surface, particularly if there is any inertia of the womb, so as to prevent an accumulation of blood within the organ. And, where the flooding persists, notwithstanding these measures, there would be no other resource than in a forced delivery. Lastly, it is unnecessary to add that, when the neck is sufficiently dilated, the accouchement is to be terminated as promptly as possible, either by the version or the forceps. In describing these two operations, hereafter, we shall be careful to point out the cases where they are to be respectively used.

A host of other remedies have been successively extolled, but I have not spoken of them, because I have never had an opportunity of employing nor of seeing them employed; besides, their mode of action appears, on theoretical grounds, to be of little value; and hence, in my opinion, their enumeration would uselessly burden the memory of students.

I do not know better how to conclude my remarks concerning the hemorrhages that may affect females, in the course of the latter months of pregnancy, and during labour, than by placing before the reader a short summary of their treatment, which M. P. Dubois caused to be distributed among the students that attended his clinique; for, as the Professor states, this table may be considered as a kind of *vade mecum*. Besides, the reader will see by it how far I have conformed to his ideas, in the treatment of hemorrhages just given.

A SYNOPTICAL TABLE

Showing the Treatment of External Hemorrhages before and during Labour.

BEFORE LABOUR.	Moderate Hemorrhage.	Horizontal position. { Absolute rest. Fresh air. Cool acidulated drinks. Restricted diet. Venesection, if there are any symptoms of plethora. Empty the bladder and rectum. Same measures as in A, excepting venesection.	
		At first cold applications—then, Ergot $\frac{3}{ss}$ divided into three doses, at intervals of ten minutes. And, if these are insufficient, to apply the tampon, or perforate the membranes.	Same measures as in A, except venesection, which is improved. { Membranes entire. Orifice not dilated and undilatable. Membranes ruptured. Membranes entire. Orifice dilated. Membranes ruptured.
DURING LABOUR.	Profuse Hemorrhage.	Orifice not dilated and undilatable. { Membranes entire. Orifice not dilated or dilatable.	
		{ Membranes entire. Membranes ruptured.	

CHAPTER II.

OF PUERPERAL CONVULSIONS.

AMONG the various convulsive diseases that may be manifested during pregnancy, parturition, or the lying-in, there is one which has such well-marked characteristics, and whose physiognomy is so peculiar, that I can scarcely comprehend the want of accuracy that still exists in the most of our classic works on this subject. This confusion evidently arises from the fact that the authors who have written on puerperal convulsions have included under this title all the affections whose striking character is a convolution; forgetting that the epithet of puerperal must be applied, not to every disease which is developed before, during, or after the accouchement (for then we might admit a puerperal pneumonia or pleurisy), but simply to one that is intimately associated with that state, and which is only produced pending its duration. This confusion is further caused, in my opinion, by designating as convulsions some afflictions that do not merit the name.

These two propositions will be easily sustained by an exposé of the distinctions admitted by some authors. For, according to them, the convulsions that occur during gestation may be either partial or general. Under the name of partial convulsions, they have described those afflictions whose principal character is a rapid, abnormal, and involuntary contraction of one or more muscular organs, and which, as a consequent, are convulsive; but which are otherwise so different from what has usually been comprised under the denomination of the convulsions of pregnant women, that it is with some hesitation, and only to avoid the reproach of having omitted any important facts, that I allude to them here. Thus, to give an example, those violent contractions of the stomach that are observed in certain women who are affected with severe and obstinate vomitings during their gestation, as also the palpitations of the heart, experienced by some others, have been classed among the puerperal convulsions.

M. P. Dubois relates having seen the walls of the belly contract with such force, in a woman in the fifth or sixth month of her pregnancy, that the uterus was completely pressed back into the excavation; and the organ was then observed to return briskly to its place, and to rebound like an elastic ball when thrown on the ground. Some

other tumefactions appeared in the flanks, in the epigastrum, and umbilical region, which seemed to depend as much on the spasmotic contraction of the viscera as on that of the ventral walls. Nevertheless, this woman recovered without aborting.

M. Velpeau states, in his excellent thesis, from which I extract the foregoing case, that a country woman, aged twenty-two years, was much alarmed on the tenth day after her delivery by the movements that took place in her belly; for something like a globe was observed through the integuments and muscles, which would travel sometimes towards the excavation, at others towards the flanks, and again in the direction of the umbilicus. This species of ball would transform itself at times into several lumps which traversed the abdomen with a rumbling noise; but the walls of this cavity always seemed to preserve their normal suppleness. This woman died insane two years afterwards, without these singular movements having altogether disappeared. Can such a case be referred, with truth, to puerperal convulsions?

According to certain accoucheurs, the vaginal parietes are occasionally so violently contracted, as to prevent the escape of the child, and even to benumb the hand of the attendant by their spasmotic action. But of all the partial convulsions, those of the uterus are the least questionable. We have already treated of the spasmotic retraction at the external and internal orifices of the neck, which in ordinary cases greatly retards the labour, and, in the delivery by the pelvis, may cause the head's extension to take place, and thus render its extraction difficult; and we shall see, hereafter (art. *Delivery of the Placenta*), what influence this retraction of the orifices (which is evidently due to a convulsive contraction at the superior or inferior part of the cervix), as well as the partial one of some of the fibres in the body of the womb, may have over the delivery of the after-birth.

We shall only mention here, that other cases, similar to those detailed by M. Dubois, have been reported, in which the uterus has been observed to pass rapidly upwards, downwards, and towards the sides of the abdomen; and even to descend with such violence towards the vulva, that it was necessary to sustain the latter with the fingers to prevent it from escaping; but, for further particulars, we refer the reader to the essays of Baudelocque and Miguel.

The instances just referred to, doubtless, resemble some of the features of the disease we are about to describe under the name of eclampsia, in being characterized by a rapid, abnormal, and involuntary contraction; but they differ from it so much, in the triple aspect of symptoms, prognosis, and treatment, that we cannot, in my opinion, class them under the same denomination, without confounding things that are essentially dissimilar.

The question now recurs, what is the state of the case as regards the general convulsions of pregnant women? Hysteria, tetanus, catalepsia, and even apoplexy, have been observed during pregnancy and parturition, and have, on that account alone, been forthwith

denominated as puerperal diseases; and although these affections offered the same symptoms as when they occur in the non-gravid state, though they were essentially different from eclampsia, properly so called, yet they were considered as mere varieties, or particular forms, of this latter complaint. True, there can be no doubt that hysteria, tetanus, etc., are modified by the peculiar conditions in which the pregnant female is found; and, as in all other diseases that occur during the puerperal period, the danger to which they expose the patient is increased by that to which they subject the foetus; but the hysteria does not thereby become less an hysteria, and the tetanic convulsion has not the less its characteristic persistence. These are evidently, therefore, distinct affections.

An apoplexy may be manifested during the puerperal state, either as the principal disease or as a termination or complication of eclampsia. Often, indeed, as stated below, the puerperal convulsions determine a cerebral effusion; but then it is an effect, and not a cause, of the accident. There are likewise some cases in which the general circulation, from the influence of the remarkable modifications it undergoes during pregnancy, is strongly determined towards the brain, and may even result in an effusion; and, if so, the latter is sometimes preceded by slight convulsions, or a tetanic stiffness in one or more limbs; but these soon pass away and do not reappear. Here then the apoplexy is the disease; but it is nothing more.

In my opinion, therefore, it must be admitted that, during the gestation, the parturition, or the lying-in, women may have attacks of hysteria, of tetanus, or catalepsy, or may be struck with an apoplexy; but these are so many distinct affections, having but one common symptom with eclampsia, the convulsion. And we hope that the details, into which we are about to enter, will illustrate the numerous differences between them.

For myself, I understand by the term eclampsia an affection characterized by a series of fits, in which nearly all the muscles of relation, and often, also, those of the organic life, are convulsively contracted; and which fits are usually accompanied with or followed by a more or less complete suspension of the sensorial and intellectual faculties for a variable period.

General convulsions (eclampsia, properly so called) constitute a disease of such rare occurrence, that, in more than two thousand deliveries effected under my care, partly at the *Hôtel-Dieu* and partly at the hospital of *la Faculté*, I have only met with three cases of it; and M. Velpeau did not observe a single one in a thousand accouchements that he superintended at *la Clinique*. It is probable, however, that this proportion is too small; for, by consulting the statements furnished by Madame Lachapelle, Merriman, Ryan, Pacoud de Bourg, etc., it appears that there was one case of convulsion in about two hundred deliveries. On the other hand, the practice of the principal accoucheurs of Great Britain would

furnish one case of eclampsia in four hundred and eighty-five labours, nearly.*

Eclampsia appears indifferently at all seasons of the year; although some authors have seemed to consider, improperly I think, that certain atmospheric conditions were not altogether foreign to its production, and that it occurs more frequently in some seasons than in others. Madame Lachapelle, who appears quite disposed to adopt this opinion, notwithstanding the summary she furnishes sustains her views but very imperfectly, relies upon the fact that at the hospital of *la Maternité*, several individuals are nearly always affected at the same time. But I am strongly disposed to believe this circumstance is rather owing to imitation than to the influences of the atmosphere.

This affection is very unusual in the early months of gestation: M. Danyau, Sr., however, met with it in a young girl, who had only reached the sixth week, and in whom the extraction of the ovum alone could remove the symptoms. The eclampsia again came on in her next pregnancy, about the same period, and was followed by an abortion; but, in this instance, the fits persisted for some time after the abortion.

A lady of Ferrare, who was about twenty-eight years of age, of a bilious temperament, and the mother of three children, was periodically attacked by convulsions as soon as she had conceived, and these attacks were renewed every two weeks throughout gestation; so that their appearance constituted in her a sign of pregnancy. As a general rule, they are quite rare prior to the sixth month; they are particularly frequent during parturition; and they appear somewhat oftener after the delivery than during the gravid state.

§ 1. CAUSES.

The causes of eclampsia have been divided into the predisposing and the determining ones. Among the predisposing causes, writers have enumerated:—

1. A plethoric constitution; as predisposing to cerebral congestions, the signs of which most often constitute the precursory phenomena of an eclamptic attack.

2. A lymphatic temperament; as favoring the serous infiltration

* Bland,	in	1897 women, met with	2 cases.
Joseph Clarke,	"	10,387 "	19 "
Merriman,	"	2947 "	5 "
Granville,	"	640 "	1 case.
Cusack,	"	398 "	6 cases.
Maunsell,	"	848 "	4 "
Collins,	"	16,414 "	30 "
Beatty,	"	399 "	1 case.
Ashwell,	"	1266 "	3 cases.
Mantell,	"	2510 "	6 "
Churchill,	"	600 "	2 "
<hr/>		38,306	79 cases.

Thus we have 79 cases of convulsions in 38,306 labours, or 1 in 485, nearly.

of the cellular tissue, which is so common in pregnant women, owing to the impediment in the general circulation, and more particularly in that of the lower extremities, caused by the womb's development.

3. Certain atmospherical constitutions that are not as yet well determined (whose influence we reject, though admitted by most authors).

4. A first pregnancy; seven-eighths of the cases of eclampsia have occurred in primiparous women; thus, in thirty-eight of those reported by Merriman, twenty-eight were of this class;* and more than two-thirds of the instances given by Ramsbotham, and twenty-nine in thirty of those by Collins, refer to women who were delivered for the first time.

5. A loaded condition of the *primæ viæ*: both Merriman and Chaussier have strongly insisted on this particular state of the digestive passages; the influence of which, they say, is fully proved by the character of the tongue, and the pain in the epigastrium, which the patient nearly always complains of at the onset of an attack.

6. The occurrence of convulsions in former pregnancies; which, according to many authors, would lead us to anticipate similar accidents in the following ones.

7. An excessive distension of the womb, whether dependent on a dropsy of the amnios or the presence of several children in its cavity; either because the impediment to the circulation is then more considerable, or because the organ itself suffers from such distension.

8. The œdema of the lower extremities, but more especially the general infiltration that invades the whole subcutaneous cellular tissue. It is by no means easy to establish the relation that may exist between the convulsive phenomena and this infiltration; but it is only necessary to read the cases detailed in the authors, to become convinced that it really has an influence over the development of eclampsia.

9. Rachitis, according to the observations of M. P. Dubois, is often connected with the production of eclampsia; but is not this a mere coincidence, or rather does it not simply act as a very remote predisposing cause? For if, as the Professor asserts, convulsions are more frequent in rachitic women than in others, it is rather owing, in our estimation, to the smallness of their stature, and to the diminished extent of the abdominal circuit, than to the primitive cause. True, rachitic women are often attacked with convulsions during their pregnancy or parturition; but this is because the uterus is incommoded in its development, pending the gestation, by the narrowness of the pelvis and the smallness of the abdomen; and hence, by reacting in turn on the surrounding parts, it constitutes a

* In the fourth edition of Merriman's Synopsis, the number of cases reported is somewhat larger, though the proportion of first pregnancies is nearly the same: thus he states, "I have attended forty-eight cases either in private practice or in consultation, in thirty-six instances of which it was the patient's first labour."—*Translator.*

greater mechanical obstacle to the performance of their functions. And in parturition, because the slowness of the travail, the energetic contractions then necessary to effect its termination, and the intervention of instruments, which often becomes indispensable, constitute so many additional sources of convulsions: in a word, it is because the woman is small, and not because she is rachitic, that she is more predisposed to eclampsia.

10. All the causes of dystocia heretofore studied may act as predisposing causes during the labour: for instance, on the part of the mother, the malformation and obstructions in the basin, a partial or complete obliteration of the vagina or vulva, all the organic alterations, the spasms of the cervix which oppose its free dilatation, any irregular or tetanic contractions in the body of the matrix, and the rupture or laceration of either the body or cervix; on that of the child, monstrosities, irregular position, etc. etc.

11. After the delivery, all the unfavorable circumstances that may complicate it and render the introduction of the hand necessary: such as, an encysting of the placenta, its abnormal adhesions, and its partial or complete retention; the presence of large coagula, an inversion of the womb, etc. etc.

Numerous other predisposing causes have likewise been described, the influence of which, however, it must be acknowledged, is far more difficult to appreciate: thus, for instance, M. Baudelocque enumerates in his thesis, a residence in large cities, the use of small or tight garments, an over-succulent diet, the abuse of spirituous liquors, constipation, retention of the urine (pointed out by Delamotte), sexual intercourse, the suppression of an habitual discharge, too much sleep, want of exercise, the frequentation of balls or plays, anger, jealousy, bickerings, disappointments, etc. There can be no doubt that all these causes, by modifying or disordering the circulation, may render it more active, and thus facilitate a sanguineous determination towards the brain; but they should evidently be considered in the light of a secondary predisposition, which may be added to some one of those mentioned above.

Epilepsy has also been considered, though improperly, as constituting a predisposition to eclampsia; for, though the two diseases have a close analogy, yet those pregnant women who were epileptic before their gestation commenced, are less subject to attacks then than at any other time. Indeed, some authors have supposed that a pregnancy suspends the epileptic fits altogether; but this is not absolutely the case, for they only occur then more seldom than usual.

In the list of occasional causes, certain writers have included the most common and indifferent circumstances, the mere recital of which we shall spare the reader; for, although the precursory phenomena of eclampsia may happen to be associated in a few instances with some vivid moral affection, or an acute physical pain, yet the convulsions are much oftener manifested without our being able to give any satisfactory reason for their appearance.

§ 2. SYMPTOMS.

Like Madame Lachapelle, we shall describe three orders of phenomena in the attack of eclampsia, which, under the triple aspect of diagnosis, prognosis, and treatment, are of great importance: namely, the precursory symptoms, those which are manifested during the fits, and those which are sometimes developed in their intervals.

A. *Precursory Phenomena.*—An attack of eclampsia scarcely ever appears unexpectedly, as it is almost always preceded by certain phenomena, which enable us to foretell its speedy invasion. Chaussier even supposed these are so constantly present, that, in the few exceptional cases where the observers have not mentioned them, it was because they were of short duration, and, therefore, either passed away unperceived, or else were misunderstood.

These precursory phenomena are variable in duration; thus, for some days (though occasionally only for a few hours) before the invasion of the puerperal epilepsy, the patients complain of agitation or malaise; they are easily excited, are impatient and irritable; they experience a marked difficulty in respiration; and they suffer from an exceedingly poignant and acute pain in the head, which, like the megrim, occupies but one half of the cranium, and sometimes it is even still more concentrated, and appears fixed upon one coronal boss, or some other equally circumscribed point. This pain in the head, which is one of the most important diagnostic signs, nearly always resists all the curative measures usually employed; it is accompanied with nausea, or even vomiting, by vertigo, dimness of vision, tinnitus aurium, and sometimes by an acute pain in the epigastrium. (*Chaussier, Denman.*)

When these primary symptoms have lasted for some time, they acquire a greater degree of intensity, and are often complicated with a more or less marked disorder in the sensorial and intellectual faculties. The vision becomes affected, the sight seeming to be obscured by a thick mist, and the patient distinguishes objects less clearly; sometimes even, as in a case observed by Dr. Meigs,* of Philadelphia, she only sees one-half of an object held before her. The hearing is likewise less distinct; the touch not so clear and less delicate; the woman's countenance exhibits an unusual hebetude; the expression is fixed, the lineaments immovable, and she appears sunk in a deep abstraction, from which she can only be aroused with some difficulty; she scarcely comprehends the questions addressed to her, and very frequently replies incoherently. In a plethoric female, the pulse is full, slow, and hard, and the face is occasionally flushed and animated; but, on the contrary, where the patient is affected with anasarca, particularly if she happens to be of an irritable, nervous constitution, the pulse is small, hard, and contracted, the face is pale and the skin cold, especially on the extremities; and sometimes there is a slight chill, or an imperfect

* Meigs' Philadelphia Practice of Midwifery, 1842, page 200.

horripilation. Besides these, some women experience pricking sensations and formications in the limbs.

When the eclampsia is manifested during the travail, it is often preceded by an extreme restlessness and an excessive agitation; and besides, the uterine contractions present for a time that peculiar character of irregularity and continuity which has given them the name of the uterine tetanus.

b. Phenomena of the Attack.—After a variable duration and intensity of the symptoms just indicated, the first fit comes on; a most accurate outline of which is furnished by M. Prestat, in his inaugural dissertation, as follows: The expression becomes at once completely fixed, and there is a moment of general immobility. Then, if the patient be attentively examined, the muscles of her face will be found agitated by slight, limited, and very rapid movements, which, however, are perceptible through the skin; these movements become more and more marked, the features are wholly altered, the muscles of the face contract in a thousand ways, and she becomes horribly distorted; the eyelids are agitated by an incessant winking, though they are wide enough apart to bring the ball of the eye into view; the latter rolls in the orbit in every direction, and then becomes fixed on one side, where it remains stationary; the pupil is dilated and immovable; the muscles on the alæ of the nose, being forcibly contracted, draw the base of the nostrils outwards, and thus render its extremity sharper; the lips are in continual motion, and one of the angles of the mouth is drawn towards the same side as the eyelids, that is, to the one towards which the head is inclined; the mouth, being at first partly open, permits the tongue to hang out, which latter is excited by irregular movements, and is thrust forward between the dental arches; and, unless the precaution be taken to return it, or to prevent the closing of the teeth, the masseters force the jaws together, and the tongue is severely bitten or bruised. The little muscles of the chin, by contracting, likewise render its extremity more pointed; so that, according to the comparison of M. Dubois, the woman's countenance then looks like a satyr's.

The convulsions never appear to this extent in the muscles of the face, without simultaneously invading those of the extremities and trunk; affecting the extensor muscles particularly, the contractions of which involve the action of the flexors. The arms, being forcibly extended along the sides, and sometimes held a little in front of the trunk, though more often turned in a forced pronation, are excited by small convulsive shocks; the fists are usually clenched, and the thumb is either flexed into the palm, or else it is extended between the index and the medius; the lower extremities exhibit a similar extension, and the same spasmodic shocks, as the arms; and the body is likewise in a state of almost permanent extension. Whence it follows that the continual tendency to throw herself about, and to change her position every instant, is not met with in this affection, as it is in many other convulsive diseases; for when the woman is placed on her back, she retains that position through-

out the whole duration of the fit; and there is no necessity for taking any precautions to prevent her from falling out of bed, or from striking herself violently on the face or other part of the body.

The muscles of the hollow organs do not remain altogether indifferent to the disorder in the external muscular apparatus; for the fecal matters, the urine, and the contents of the stomach, are often found to be rejected by the convulsive contraction of the reservoirs in which they had accumulated.

The respiration is interrupted and hissing, being effected by continual gaspings, and without any regular order; sometimes, indeed, as Madame Lachapelle has observed, it is wholly arrested by the spasmody contraction of the diaphragm and other muscles of the thorax, whereby the hematosis becomes suspended; and this momentary asphyxia satisfactorily explains the bluish or even livid color in the face and extremities. The superior portions of the body, the head and neck especially, swell up; the carotids beat violently, and the jugulars stand out prominently; as in epilepsy, the salivary glands secrete a more considerable quantity of saliva, which, being agitated by the air as it penetrates into the chest, forms a consistent foam, which gives rise to a constant frothing at the mouth, and which is not unfrequently stained with blood coming from the wounds in the tongue.

At the commencement of the fit, the pulse is full and hard, subsequently becoming smaller and almost imperceptible; the skin is hot and dry, and is soon covered by a profuse perspiration. This transpiration usually coincides with a diminution in the frequency and intensity of the spasm, and announces its speedy termination. While it lasts, the sensorial and intellectual functions are wholly abolished; the patient is neither conscious of sound nor light; the sensibility is entirely lost, and we may pinch, incise, or burn the skin with impunity, and without her knowledge, and even without her recollection after the fit.

Pending its duration, the uterus sometimes remains wholly passive, says M. Bouteilhoux, astonished, as it were, at the universal disorder; but more frequently it participates in the general irritation, and contracts forcibly; although these contractions are scarcely perceptible to the woman; for many patients who have been delivered during the fit can hardly believe that such is the fact. But, whether the convulsions be manifested in the course of the parturition, or whether they have preceded it, the uterine contractions have very nearly their ordinary character. Nevertheless, the fits, although not developed at each pain, reappear nearly always just at the commencement of one. "This appears to me to be so manifest and decided," says Dewees, "that I think I could tell what is going on at the mouth of the uterus, without an examination per vaginam."

The cessation of the convulsive motion is never abrupt; the movements and spasms gradually become less violent; the respiration is less hurried and more full; the face loses part of its lividity; the muscles are only agitated at intervals, and their action resembles

that which is excited by passing a brisk electric shock through them.

In general, the first fit is of short duration, and not very violent; but, in most cases, the fits are repeated frequently, and the symptoms become more and more frightful in proportion as they are renewed; the succeeding one, say Merriman and Velpeau, being often heralded by an uncommon slowness in the pulse. In the latter paroxysms, Madame Lachapelle has remarked that the convulsive shocks are less considerable, and sooner over than the earlier ones, but that the comatose symptoms are more grave and persistent.

The duration of an attack is very variable. The first fits are commonly the shortest, becoming more prolonged as they are renewed. At first, they last from one to two minutes, and afterwards from three to four; but they rarely exceed six to eight minutes. It is said that they have lasted for a quarter or half an hour, and even for a whole hour; but those authors who pretend to have known them to continue in this way, or even for several hours, have evidently confounded both the convulsive and the comatose periods as being parts of the paroxysm. The number and rapidity of the convulsions are equally variable; though, in nearly all cases, there are two or more, and sometimes they have reached as high as thirty. In some instances, there is an interval of several hours, or half a day between them; while in others on the contrary, only a few minutes elapse before the return of the next.

c. *Interval.*—The patient remains in a state of complete prostration during the intervals of the first three or four paroxysms; but she soon comes to herself, opens her eyes, and looks at everything around with astonishment; she scarcely recognizes the persons and objects about her, and she cannot be made to comprehend the distress and anxiety of her friends and family, for she has no knowledge of what has taken place while the fit lasted; but in a short time her ideas become clearer, and at length she entirely recovers the use of her faculties. These lucid intervals are quite prolonged after the early attacks; but, as they are renewed, the moments of intelligence become shorter and shorter during their intervals, and the woman ultimately sinks into a state of profound coma or apparent death; from which she is only aroused by the return of fresh convulsive movements.

This comatose state presents all the characteristics of an intense cerebral congestion, of which indeed it certainly is a consequence; the stupor is profound, the face injected, the respiration stertorous, and the limbs are in a state of perfect flexibility; but the sensibility, though greatly blunted, is rarely lost altogether, for when we pinch the patient, or rub her roughly, she shows signs of uneasiness, and groans very much like those individuals who are laboring under a severe concussion of the brain. However, the torpor may be such that the sensibility is entirely lost; but even then the female appears to be conscious of the pain caused by the uterine contraction, for, when the latter is manifested, she evinces, by her countenance and groans, the sufferings she experiences. As to the intellectual facul-

ties, they seem to be wholly abolished; the pupils are dilated and insensible, but in general the pulse is strong and developed.

When this comatose state is about passing off, it changes into a somnolency, from which the woman may be aroused by speaking to her; and the sensorial faculties gradually return. When the torpor is dissipated, she complains of great fatigue, and of a feeling of painful weariness; then, at the end of a variable period, this prostration gives way to a great anxiety, the prelude of a fresh attack.

§ 3. TERMINATION OF ECLAMPSIA.

An attack of eclampsia may terminate either by recovery, by death, or by giving rise to some other disease. Where the patient is likely to get well, the paroxysms are usually few in number, of short duration, and occurring after long intervals. During this latter period, the female recovers more or less completely the use of her limbs, as also of her sensorial and intellectual faculties.

When the fit is about to disappear, the intellectual faculties are the longer in regaining their normal condition as they have been the more disordered, or as they have been suspended for a greater period. The memory particularly is much weakened, sometimes even is altogether destroyed, for the patient not only cannot recall what took place during the fit, but she has likewise forgotten the common occurrences of the few days preceding the invasion of the symptoms; and it is only restored by degrees, each hour adding some facts to those which she had previously recovered the recollection of. It is singular that this defect of memory is often limited to isolated words; thus some have been known to forget entirely the names of their nearest relatives; others could no longer recall the name of the street, or the number of the house they occupied; and certain others again had entirely lost the memory of dates.

Alphonse Leroy reports one instance in which a very singular aberration of vision followed some convulsive phenomena, that held the patient's life in jeopardy for several days; all the objects that were brought before her, and all the surrounding persons, looked black.

The sight and hearing likewise require a certain time for the recovery of their perfect integrity; the woman's general condition is thus gradually ameliorated, and ultimately she regains her usual health.

On the contrary, when the disease is about to terminate by death, the convulsive movements are observed to last for four, five, or six minutes with great intensity; they occur in rapid succession, and, during the interval that separates them, the female is sunk in a torpor, from which she cannot be aroused by any external irritants. The period at which death takes place under such circumstances is very variable, though in general it is between twelve and forty hours after the invasion of the first symptoms; and it may occur either in the convulsive stage, or in that of the coma. In the former case it is evidently due to asphyxia, which is itself produced by the paralysis, or rather by the permanent contraction of the inspiratory

muscles;* in the latter, it is a result of the cerebral congestion, and sometimes even of a true apoplexy.

Again, an attack may not be grave enough to end in death, and yet may give rise to several very serious disorders. For instance, when the eclampsia occurs in the commencement of the travail, the violent contractions of the womb may cause a rupture of the organ, if the os uteri is not sufficiently dilated. Again, it is possible that the disorders in the circulation may occasion a cerebral congestion; and the consequent engorgement of the vessels of the brain may be such as to produce their rupture, which is followed by an apoplectic effusion, and, as a consequence, by hemiplegia. In plethoric women, this anatomical lesion might even be produced by the early paroxysms; and it is probably in this way that the cases observed and described by M. Ménière, under the name of puerperal apoplexy, must be interpreted.

A sanguineous determination may also take place towards the lung, and thus produce a congestion of that organ. But independently of these unfavorable complications, which constitute so many new diseases for the physician to combat, there is another one which is less immediate, but not less rare, says Madame Lachapelle, that is, puerperal peritonitis.

In conclusion, certain cutaneous or intestinal inflammations may result in consequence of the energetic measures employed against the eclampsia. For example, the sinapisms that are then crowded on the lower extremities are not felt by the patient, and may be forgotten in the general agitation; consequently, they remain applied too long, and thus produce erysipelas and severe vesications. A lady, reported by M. Velpeau, was attacked, on the second day of her convalescence, by a violent erysipelas over the whole leg, because the sinapisms applied there produced no effect at first, and therefore were allowed to remain on too long.

§ 4. DIAGNOSIS.

The minute detail into which we have entered in giving the description of the symptoms of eclampsia might possibly dispense with a return to its principal characters; but as there are some affections that have a strong analogy to puerperal convulsions, we shall again bring forward the signs by which they can be distinguished.

When considered as a whole, eclampsia is so easy to diagnosticate, and its symptoms are so well marked, that it really seems useless to recapitulate them; but it is composed of two widely different stages, the paroxysmal and the comatose, during either of which the physician may be called upon to decide what is the nature of the affection. Thus, during the paroxysm, it may be confounded with hysteria, epilepsy, catalepsy, or tetanus; while apoplexy, or a cerebral con-

* This asphyxia might also result, according to Boér, as a consequence of the obstruction of the bronchial ramifications, in which a considerable quantity of frothy mucus sometimes accumulates.

cussion, and the coma of drunkenness, may be mistaken for it in the comatose stage.

However, in hysteria there is sometimes an alteration, but never a total abolition, of the intellectual powers; indeed, the sensorial faculties have an unusual degree of delicacy and perfection; there is no coma after the fit, and the convulsive movements are altogether different from eclampsia: thus, the limbs become forcibly flexed (instead of being extended), and they subsequently writhe with violence, there is a continual tendency to change the position, and the patient would certainly throw herself out of the bed if she were not held down by vigorous arms. Again, a hysterical paroxysm is nearly always preceded or accompanied by the sensation of a ball rising from the hypogastrium towards the throat, which gives rise to a feeling of suffocation similar to that produced by strangulation; and, lastly, there is scarcely ever any frothing at the mouth, as in eclampsia.

But of all the convulsive affections, epilepsy is the most likely to be confounded with eclampsia; however, after the epileptic fit is over, there is but little or no coma, whereas more or less always exists after the puerperal convolution. This is the only distinctive character, or nearly so; but, unfortunately, even this is not uniform; for an epileptic attack is sometimes followed by a profound coma.

The persistence of the convulsive rigidity in the limbs distinguishes tetanus from every other disease. Finally, catalepsy presents as an essential character the singular peculiarity—that the extremities often preserve throughout the whole fit the position which they happened to have at its commencement, or any one we can succeed in making them assume during this convulsive state.

The comatose stage of eclampsia will be distinguished from apoplexy by the following signs: it has been preceded by some convulsive phenomena, which is not the case in the latter disease; all the extremities are in a state of complete resolution, and they have entirely lost their sensibility and mobility; and, most generally, a hemiplegia instead of a paraplegia results as a consequence of the cerebral effusion. Though it must be observed that, when the eclamptic paroxysms are frequently renewed, and the patient's intelligence has been lost for some time, the cerebral congestion, which keeps up the coma, may determine an effusion into the substance of the brain. As soon as the hemiplegic phenomena are manifested, it will be possible to detect, on the side opposite to the one where the effusion took place, a more complete loss of the sensibility and mobility; though the limbs on the other side may be in a state of resolution. The reader will understand that, if the previous history were unknown, the diagnosis would then be very obscure. The loss of intelligence is always constant and total in eclampsia, whilst this phenomenon may be wanting in apoplexy, or be limited to a simple obtuseness.

In cases of a concussion of the brain, the absence of all previous

convulsions, together with the presence of the marks of a fall, or of a violent blow on the head, will serve to make out the diagnosis.

Lastly, the previous history of the patient, the ejections of the contents of the stomach mixed with a large quantity of alcoholic liquors, and the vinous odor in the breath of intoxicated individuals, will enable us to distinguish the coma of drunkenness from that of eclampsia.

§ 5. PROGNOSIS.

Eclampsia is a very fatal disease, for one-half of the women who are afflicted with it are lost. "Such, at least," says Madame Lachapelle, "is the result of our best therapeutical resources; and, although the records of private practice may furnish a less unfavorable account, yet the registers of *la Maternité* afford a melancholy illustration of the great danger of this disease." The prognosis varies, however, according to the cause that gave rise to the convulsions, to the stage of the puerperal condition at which they are manifested, and to the particular progress of the symptoms.

But of all the various predisposing causes, a serous plethora, or a partial or general infiltration must give rise to the most unfavorable prognosis. The convulsions dependent on this cause, says Madame Lachapelle, are the most obstinate of all; but, perhaps this is owing to the fact that blood-letting cannot be repeated so often, or be carried to such an extent, as in women of a different constitution. And Dugès says, if women of a sanguineous temperament are less exposed to the mortal coma just described, they are possibly more subject to the consequences of apoplexy which are found to succeed the eclampsia: such as the divers paralyses, mania, and acute arachnitis. Finally, the convulsions that are developed in hysterical and epileptical patients, or in women of a great nervous susceptibility, and those which succeed any acute moral emotion, are less formidable than those which have no relation with the former nervous state of the female.

As the depletion of the uterus is one of the most favorable conditions for the cure of the paroxysms, it is evident that, other things being equal, eclampsia is far more serious when it comes on at the commencement of the travail, than where it is not manifested until the dilatation of the parts is so advanced as to render a spontaneous or an artificial termination of the labour both possible and easy. The convulsions are likewise more dangerous when manifested at an early period of the gestation; not only because the patient (in case of recovery) is exposed to fresh attacks during the remainder of this state, but also because the complete obliteration of the orifice, and the hardness and length of the cervix, will render the womb's depletion impossible. It is unnecessary to add that, in this respect, the primiparæ will be much more exposed than women who have previously borne children. Lastly, that which takes place after the delivery is the least unfavorable of all, or rather such is the opinion of Dugès; but, according to Ramsbotham, the prognosis would then be much more serious. I have remarked, says the latter, that when

the convulsions come on in the last stages of labour, and continue after the delivery, the woman generally dies; but if they are arrested by the travail, they seldom return, and a gentle slumber which then succeeds is the signal of a prompt convalescence.*

The course and intensity of the symptoms of a convulsive attack greatly influence its termination: thus, when the paroxysms are numerous and violent, and follow each other in quick succession, more particularly if the comatose state is prolonged during the whole interval that separates them, and when the patient does not recover the use of her sensorial and intellectual faculties in this interval, the prognosis is exceedingly unfavorable; for death most usually results as a necessary consequence.

Again, it must not be supposed that all danger is over when the labour is terminated and the convulsions have altogether disappeared; for, according to Denman, Collins, and others, the patients are then much exposed to consecutive abdominal inflammations, which, as is well known, often compromise their existence.

As regards the child, the prognosis of eclampsia is even more unfavorable than it is for the mother, and it very frequently dies during the convulsions that take place in the course of the gestation or at the commencement of parturition; for the disorder created in the maternal circulation must necessarily affect that of the foetus. At a more advanced stage of the travail, a similar effect may likewise be produced; besides which, it is evident that the version or the application of the forceps, which is then so often necessary, always endangers its existence more or less. Thus, in fifty-one children reported by Merriman, thirty-four were stillborn, and seventeen were born alive; which statement, unfavorable as it is, proves at least that, contrary to the opinion of many accoucheurs, the child is not always lost; and that we should not estimate its life as being worthless in those cases where the intervention of art becomes requisite. However, the infant of an eclamptic mother is not yet free from every danger, even though born living; for it often dies of convulsions in the course of a few days after birth, the germ of which it seems to have derived from the parent's body.

§ 6. PATHOLOGICAL ANATOMY.

Thus far *post-mortem* examinations have thrown no light on the nature of eclampsia, for most usually this disease leaves no appreciable anatomical lesion behind. Often, indeed, there is a little serosity found in the ventricles or arachnoid cavity, and possibly a more or less evident congestion in the encephalic vessels; and when this affection has terminated by an apoplexy, the dissection has exhibited either an apoplectic extravasation into the cerebral substance, or else a free effusion on its surface. But these are evidently no-

* Dr. F. H. Ramsbotham, in the second edition, further states: "From what I have seen of this disease, I should say that convulsions coming on *after* delivery, if the patient has not suffered an attack before, are not so dangerous as those which arise during pregnancy and labour."—*Translator.*

thing more than secondary lesions, the effects, and not the cause, of the convulsions.

In a woman who died from puerperal epilepsy, M. Prestat found a little body of a stony consistence, and about as large as an ordinary pea, in the corpus striatum of the right side; and, in another case, M. Baudelocque detected an ossification of the dura mater. But M. Prestat was certainly correct in regarding such anatomical lesions as mere coincidences, for nothing would warrant the conclusion that a relation of cause and effect exists between them and the convulsions.

§ 7. TREATMENT.

The management of eclampsia must necessarily be divided into the preventive and the curative treatment. The preservative course consists in the employment of the measures calculated to prevent, as much as possible, the influence of those causes that have been found to predispose females to convulsions. In the first rank we must place venesection, which ought to be repeated several times in the course of the gestation in those women whose sanguineous temperament predisposes them to cerebral congestions;* this might also be practiced with the happiest success in oedematous females, more particularly when the precursory phenomena of eclampsia shall be manifested. In the latter, we should also resort to the measures calculated to diminish the volume of the parts distended by infiltration; such as derivatives to the intestinal canal and urinary passages, the application of compresses steeped in cold water, or some aromatic decoction, and to punctures with the lancet. Nervous and irritable women, of a dry habit, will also be benefited by a moderate bleeding in the arm, and by lukewarm baths, repeated frequently during the latter months of pregnancy; and they should avoid all acute moral emotions, etc., with the greatest possible care.

After the venesection and purgatives have been tried, Drs. Collins and Johnson highly extol the use of tartar emetic, administered in such a way as to nauseate without producing vomiting. For this purpose, a tablespoonful of the following mixture is given by the mouth every half hour:—

R.—Tartar emetic,	gr. vi;
Laudanum,	gtt. xxx;
Simple syrup,	f <i>ʒ</i> ijss;
Infusion of pennyroyal,	f <i>ʒ</i> uij;
F. M.	

* By way of showing the importance of venesection as a preventive measure, Dr. Dewees relates the following case: Mrs. —, pregnant with her first child, was seized with frequent headaches towards the end of her gestation; she neglected to be bled, and was attacked with severe epileptic convulsions at the onset of labour, from which, however, she recovered. During her second pregnancy she was bled freely, and delivered without accident. In the third and fifth, venesection was not resorted to, and they were attended with convulsions; whilst, in the other gestations, she had recourse to this remedy, and was safely confined.

The quantity of tartar emetic is increased or diminished according to the intensity of the symptoms, and the imminence of the disease. The same potion is also strongly recommended as a curative measure, after the invasion of the convulsive attack.

During parturition, the accoucheur should endeavor to modify or prevent the influence of the various causes of dystocia; thus, for instance, if the contractions assume the character of irregular, tetanic pains, he must attempt to restore them to their normal and regular type, by a resort to bathing, to the opiates, or belladonna, and to venesection; for it is an ascertained fact that the excessive agitation produced by these pains is often the forerunner of eclampsia, in a nervous and irritable woman. Besides these remedies, it is necessary to take the precaution of emptying the bladder and large intestine at the commencement of labour.

All these measures are particularly indicated when the patient, under care, had previously suffered from convulsions in her former labours, for she is, by that very fact, predisposed to a return of them.

After the delivery, the accoucheur might often prevent this accident, by carefully exploring the state of the womb subsequent to the expulsion of the child and placenta; and by assuring himself that it is well retracted, and that it contains no foreign bodies, such as coagula, or portions of the membranes or placenta.

The curative treatment consists of the general measures that are applicable in all cases, and of the special means, which necessarily vary according to the period at which the puerperal convulsions are manifested.

A. *General Measures.*—At the head of the list of curative means we must place sanguineous emissions, which have been resorted to under every form. To these, therefore, we must first have recourse; but, in the employment of this remedy, several questions, that are important in a practical point of view, are presented for solution. Ought we to employ general or local bleeding? And, if general, which vein is to be opened? And what quantity of blood should be drawn?

In a large majority of cases a general venesection will first be preferred; and the revulsive application of leeches or cupping will only be resorted to in those instances where the convulsions shall have followed a profuse hemorrhage. Where free bleeding has been practiced, and the coma continues, notwithstanding, throughout the whole interval between the fits, thus announcing an intense congestion about the encephalon, we might apply leeches with advantage to the mastoid processes, or to the neck, and also, perhaps, around the malleoli.

Writers have sharply discussed the question as to what vessels should be opened; and arteriotomy in the temporal, bleeding in the arm or foot, and opening the jugular vein have been extolled in turn. The advantages of blood-letting are very nearly the same, whichever vessel be opened; and, consequently, as venesection in the arm is by far the most easy, and as we can always obtain there as much

blood as may be deemed advisable, this is usually practiced, and as a general rule should be preferred. The quantity of blood to be drawn varies according to the patient's constitution, the violence of the paroxysms, etc. etc.: thus, in lymphatic individuals, we should, as a general rule, be satisfied with the extraction of fourteen to eighteen ounces; and if the symptoms still continue after this, and it be deemed necessary to keep up the sanguineous emission, it ought to be confined to the application of fifteen, twenty, or thirty leeches behind each ear.*

In plethoric women, after a copious bleeding of sixteen ounces, a second, of ten to fourteen ounces, might be resorted to, two or three hours afterwards, and perhaps even a third; but a fourth is rarely admissible, and we would preferably apply, instead, either leeches to the mastoid processes or cups to the back of the neck. Simultaneously with the venesection, it is advisable to produce a salutary derivation to the intestinal canal and skin. The emetics have been recommended for this purpose; but, in most cases, they ought to be proscribed, as being calculated to augment the convulsive movements and cerebral congestion by the retchings they determine; the purgatives are much to be preferred. If the patient recovers her intelligence during the intervals, and she can be induced to swallow, we might exhibit castor oil by the mouth in the dose of one or two ounces; or still better, two grains of calomel every quarter of an hour, until it produces a purgative effect. If, on the contrary, she cannot swallow, a plan advised by Merriman might be adopted; that is, to put the calomel mixed with moist sugar in equal proportions between the lips and alveolar arches, or, if possible, into the mouth, and renew it until a stool is procured. If this latter measure be ineffectual, it will be requisite to act on the lower part of the intestinal canal by administering injections, which have been rendered purgative by the addition of an ounce and a half, or two ounces of castor oil, or of the miel mercurial, and, if necessary, by incorporating with it a few drops of croton oil, or spurge.

There are yet some other measures that cannot be relied on when employed alone; but which, nevertheless, are too important to be neglected. We allude to sinapisms applied successively on the thighs, calves of the legs, and feet, to vesicatories, and to dry cups placed on the back of the neck, and on the lower extremities. I apply them, says M. Velpeau, to both thighs and the nape of the neck, so that their action will become manifested, whilst we are engaged with the blood-letting, blisters, or leeches.

They have appeared to me, remarks M. Prestat, particularly useful in oedematous women; only it is necessary to watch their effects for a few days afterwards, lest their surface becomes gangrenous.

I place an application of the large cups of Dr. Junot to the lower extremities in the first class of revulsives, as being the most power-

* The reader will bear in mind that the leeches directed in the text are of the European variety, which extract a much larger quantity of blood than our own.—*Translator.*

ful and prompt in their action of any. In a case of eclampsia, that occurred five hours after the delivery, the symptoms lasted for thirteen hours; and the patient's condition became more and more dangerous, notwithstanding the employment of all the measures just spoken of. At the first application of these cups, the convulsive paroxysms disappeared; at the second, the coma became less profound; and at the third the patient regained her intelligence. (*Vide note by myself in the Annales de Chirurgie, Oct. 1843.*)

Such are the measures that ought to be primarily employed; but there are certain others which, without having the same efficacy, may however prove very useful. For instance, when the intervals between the attacks last for an hour at least; and, during all this time, the patient has recovered her senses, it is advisable to place her in a lukewarm bath; and, whilst she is there, to keep compresses steeped in some iced liquid, constantly applied on her head. This application of cold should be kept up throughout the whole duration of the attack; this measure has often seemed, in our hands, says Madame Lachapelle, to second the venesection beneficially. It is particularly useful when a febrile coma succeeds the eclamptic paroxysm; as also when the occurrence of delirium announces the commencement of a cerebral fever.

The antispasmodics, recommended by M. Velpeau in the hysterical form of eclampsia, that is to say, in the hysteria of pregnant women, appear to me useless in most cases of puerperal convulsions; and it would only be as a preventive measure, or else in a very slight attack, that they could be resorted to with benefit; besides which, we should lose precious time by depending on them in these grave cases.

The compression of the two primitive carotids, which has recently been proposed as a remedy for most convulsive affections, has been successfully practiced in some cases of eclampsia; and hence it constitutes another measure to which we might recur, without, however, attaching too much importance to its action, for it has failed in several instances. (*Journal de Trousseau, Nov., 1840, p. 186.*)

In my estimation, the opiates ought to be wholly banished from the treatment of a disease which so often terminates in cerebral congestions.

During the paroxysm, the necessary precautions must be taken to restrain the patient's dangerous movements; but it is not requisite to employ violence for that purpose, as some persons advise; for we have elsewhere stated that there is scarcely any tendency to change the position; and it will be quite sufficient to merely watch over her, without endeavoring to prevent the convulsive movements, the intensity of which might thereby be augmented.

Particular care is requisite to prevent the tongue from being bitten, since it is very liable to be pushed beyond the alveolar arches, and it often becomes wounded by the convulsive contraction of the masseter muscles. To prevent such an accident, it has been advised to place some hard body, the handle of a spoon, for instance, between the teeth, so as to hold them apart; but Madame Lacha-

pelle says this is an almost infallible remedy for breaking the incisors. Gardien directs a piece of cork to be put between the molars instead, as it would not be attended with this inconvenience; but this might escape from the fingers, and be drawn down, by an inspiratory movement, into the opening of the glottis, and thus suffocate the patient. A much more simple plan is to push back the tongue behind the alveolar arches with the fingers themselves, at the commencement of each fit; when, the jaws being once closed, the tongue can no longer protrude; true it may be contused between the teeth, but that is all. Besides, this little operation may easily be explained to the assistants, who perform it without difficulty, as soon as they have overcome the chimerical fear of being bitten.

b. Special Measures.—The course pointed out thus far might be considered as the medical part of the treatment of puerperal convulsions; but, as the existence of gestation is the primitive cause of eclampsia, it is in the evacuation of the womb that the accoucheur must evidently hope to find his most powerful resource in these grave cases. Of course, the indications presented by this portion of the treatment will vary, according to whether the convulsions are manifested in the course of pregnancy or during parturition, or subsequent to the delivery.

1. During the Gestation.—Prior to the seventh month, that is to say, before the period at which the foetus is viable, the treatment must be restricted to the employment of the means above indicated; for, unless there be an absolute certainty that the foetus is dead, nothing should be done to induce an abortion. But is the same plan to be adopted at a more advanced stage, when the woman has arrived at the eighth or ninth month? Here two very different cases may present; that is, either the uterine contractions are prematurely and spontaneously developed under the influence of the general convulsions, or the matrix remains entirely apart from the general disorders produced by the eclampsia. In the former case the labour has commenced, and we shall treat below of the means to be then employed, upon which most accoucheurs are agreed; but, in the latter, the proper course to follow is far from being so clearly marked out. The question naturally arises, what then is to be done, supposing the eclampsia has resisted venesection, the intestinal and cutaneous revulsives, etc.; and supposing that the patient has arrived at the eighth or ninth month, and the labour has not commenced, but still the convulsions continue and threaten the mother's life.

The provoked delivery, advised by M. Stoltz, and recommended to the attention of practitioners by M. Velpeau, appears to me the only available measure. Indeed, according to Levret and the majority of authors, the convulsions that come on during gestation ordinarily disappear as soon as the travail regularly sets in. This assertion is generally true; but would it not be equally so to say that the only resource against eclampsia, when this has resisted the employment of all the rational measures, would likewise be in a delivery? (*Stoltz, Thesis of M. Ferniot.*) The rupture of the mem-

branes is, in my opinion, the best method of effecting it in the case before us.

2. *During the Parturition.*—The indications to be met will vary according to the stage of the travail at which the eclampsia is manifested, and also with the progress and severity of the symptoms. These indications will be better understood perhaps by the successive consideration of the following questions. What ought to be done when the os uteri is dilated or dilatable? And what is the proper course to pursue when it is neither sufficiently dilated to permit a prompt artificial termination of the labour, nor dilatable?

Supposing the eclampsia is slight, that is, the convulsive attacks are moderate, the interval that separates them quite long, and the woman recovers her senses during this interval; and further, supposing that the travail is advanced, the dilatation of the os uteri is completed, the child's head has cleared the cervix, and descended early into the excavation; and that the uterine contractions are strong and energetic, and the perineum only offers a moderate resistance, we think that the child's expulsion should be left to the natural efforts.

But if, under the same conditions, the pains are feeble, distant, and ineffectual, or if the contractions are energetic, but the convulsions are frequent and prolonged, with profound coma during the interval of the paroxysms, we believe that the mother and infant should be immediately relieved from the dangers that threaten them, by the application of the forceps.

When, so far from having cleared the os uteri, the head is still retained above the superior strait, the pelvic version would in general appear preferable to an application of the forceps. (*Vide Forceps.*) We say that the version would appear *in general*, not always preferable, for we know this is at times impracticable, even where the head is still above the abdominal strait. The almost total discharge of the amniotic liquid, and the violence in the contractions of the uterus, which often participates in the general convulsions, sufficiently explain our reserve, as well as the preference that we accord to the forceps in this particular case.

Should the face present, and be well down in the excavation, we would likewise apply the forceps; but, on the contrary, we should have recourse to the pelvic version if it were yet above the superior strait, or even when engaged in this strait, if it happened to be in a mento-posterior position. In the presentations of the pelvic extremity, it is advisable to hasten the termination of the travail, by drawing judiciously and carefully on this extremity. In the presentations of the trunk, the feet are to be brought down; for we would only have recourse to the cephalic in preference to the pelvic version, inasmuch as there might exist a retraction of the basin, and when the cephalic version is resorted to, it must evidently be followed by a prompt application of the forceps.

What ought to be done when the os uteri is neither dilated nor dilatable? If the membranes are not broken, and more particularly if the uterus appears to be greatly distended by a large quantity of

water, they should be ruptured, and a discharge of the liquid and a partial depletion of the organ be facilitated, by pushing up the presenting part with the finger ; for such a rupture has often proved sufficient to diminish the frequency and intensity of the convulsive paroxysms, and has justified the accoucheur in waiting for the complete dilatation of the cervix. Though where this dilatation progresses too slowly, the ointment, or still better, the extract of belladonna should be employed, and be smeared over both the internal and external portions of the orifice.

But supposing the eclampsia is more serious, the coma still continues, and the convulsions have not been alleviated by the rupture of the membranes ; and, moreover, the os uteri is not yet dilated, or else is so convulsively contracted as to prevent an introduction of the hand or instruments, are we, under such unfavorable circumstances, to abandon the delivery to nature, as some accoucheurs advise ? Or, on the contrary, ought we to penetrate forcibly into the uterine cavity, by opening a route by violence, or a cutting instrument.

At the commencement, or even during the first four or five hours of labour, these extreme measures doubtless should not be resorted to ; but when the convulsions persist, notwithstanding the employment of the most rational means ; when ten, twenty, or thirty hours have elapsed since the onset of the symptoms ; when the woman's life is compromised by the duration and the constantly increasing intensity of the paroxysms, our only hope is in a depletion of the uterus ; and a forced delivery then appears to us the sole resource.

Two plans have been proposed for effecting this object ; namely, a forcible introduction of the hand into the womb, and the division of the cervix by the aid of a cutting instrument. We shall hereafter revert to the mode of operating in both cases when describing the difficulties that may be met with in making the pelvic version ; and will therefore only remark here that, by the length of time it demands, by the excitement and irritation thereby produced (all which are assuredly calculated to increase the convulsions), and by the lacerations to which it gives rise, however carefully it may be performed, the forcible introduction of the hand into the womb is very dangerous, and ought to be rejected ; and that, unless there is a very feeble resistance at the orifice to be overcome, repeated incisions, made at divers points on the circumference of the neck, ought, in our opinion, to be decidedly preferred.

But, whatever operative process be employed, the resistance from the os uteri being once overcome, the accouchement will be terminated by an application of the forceps, or by the pelvic evolution, according as the conditions shall be found more or less favorable to the practice of the one or the other operation ; which indications will be carefully detailed when we shall treat of version and the forceps.

3. *After the Delivery.*—The only special indication, presented by eclampsia after the child's expulsion, is to extract the after-birth and

all the coagula, together with any portions of the membranes that may have been retained in the uterus; and to remove the sanguous matters and detritus by detergent injections thrown up into its cavity.

CHAPTER III.

OF RUPTURES OF THE UTERUS.

A RUPTURE of the womb is one of the most dangerous accidents that can happen to the female in the puerperal state. Exceedingly rare during the early months of gestation, it is somewhat more frequent in the latter half of pregnancy; but it is during the second stage of the travail, especially, that it most frequently takes place.

A uterine rupture has seldom been observed in women bearing their first child. Thus, in seventy-five cases, reported by Churchill (page 357), nine occurred in primiparæ, fourteen in women in their second pregnancy, thirteen in their third, and thirty-seven in their fourth or succeeding ones.

The woman's age does not seem to have any marked influence over the production of this accident. Nevertheless, the organic alterations which constitute a predisposition are more unusual in early life than in advanced age.

As the male child is ordinarily somewhat larger than the female, this, according to Dr. Clarke, would be a predisposing circumstance; thus, in twenty cases of rupture, mentioned by Dr. M. Keever, fifteen were male children; and of thirty-four cases by Collins, twenty-three of the children were boys.

The rupture may be seated either in the body or the neck of the organ. When it affects the cervix, it is highly important to ascertain whether it only involves the sub-vaginal portion, or whether it invades that part situated above the insertion of the vagina; because the former is attended with very little danger, and occurs very frequently; indeed, it takes place at nearly every labour just at the instant when the head is clearing the orifice, and it is scarcely ever followed by any unpleasant symptoms. The last, on the contrary, presents the same dangers, and has similar consequences as the ruptures of the body. Therefore, we need only mention here the lacerations that are limited to the orifice, and which do not extend beyond the vaginal insertion; and all that we are about to say concerning uterine ruptures refers exclusively to those in the body of the womb and in the supra-vaginal portion of the neck. These latter are the more frequent, and they are located somewhat oftener on the posterior than on the anterior face.

§ 1. CAUSES.

A rupture of the uterus always supposes a distension of the organ,

and this distension is most frequently dependent on pregnancy. The uterine walls become softened, in consequence of the modifications they undergo; their thickness is a little diminished at certain points, and they become more supple, more elastic, and therefore better calculated to support a slow and gradual pressure; for owing to this suppleness, they can yield without rupturing, though their distension renders them less fitted to sustain a sudden and forcible shock. By this distension, and the increase in volume to which it gives rise, the uterus is forced to ascend above the superior strait; and thenceforth it is no longer protected by the osseous walls of the basin, and, consequently, it is more exposed to external violence, from which it was shielded during the non-gravid state. Becoming from its situation, in immediate contact with the abdominal parietes without the intervention of any other body, more subjected to the unequal pressure which the rapid and irregular contraction of the abdominal muscles during any violent efforts may make upon it.

Pregnancy, and the modifications thereby impressed on the uterus, are therefore the essential predispositions to a uterine rupture; but, independently of these conditions, which exist in all gravid women, there is a number of other circumstances which have a more immediate influence over the production of this accident; and which authors have designated under the titles of the predisposing and the determining causes.

1. Predisposing Causes. — Under this head we must include everything that can augment the distension or diminish the resistance of the uterine walls, as, for instance:—

A. A great abundance of the amniotic liquid, the presence of several children, etc.

B. The extreme thinness of the uterine walls, which is met with in certain women, and which cannot be accounted for.

C. An enfeeblement of the uterine parietes, dependent on causes which have operated at a more or less remote period, such as falls, blows, etc.; these contused or bruised walls inflame, become softened, and ulcerate; sometimes the rupture comes on during the same pregnancy, at others, several gestations may succeed it without any accident, and yet a rupture take place at a subsequent one.

The enfeeblement may likewise result from divers softenings; such as those designated by M. Dezeimeris as the atrophied, the apoplectic, the inflammatory, and the gangrenous ramollissements, and those produced by organic alterations. We must add another circumstance, which is, in truth, very unusual, but whose influence has been fully demonstrated by several well-attested instances: namely, those women who have undergone the Cæsarean operation, and who have had the rare fortune to escape the grave dangers that attend it, seem more disposed than others to uterine rupture in the following pregnancy; thus, Dr. Kayser has brought forward six cases in his excellent thesis, in which the patients, who had before been operated upon safely, have been compelled to submit to gastrotomy, in consequence of a rupture of the womb; three of these women died.

D. All the organic alterations, and all the degenerations in tissue

of which the uterus may be the seat; such as the scirrhous, fibrous, or encephaloid tumors. Because the softening and ulceration of these morbid masses may render that portion of the walls they occupy thinner and weaker; or, on the contrary, they may augment the thickness and even the consistence of the uterine tissue; but still act as predisposing causes of ruptures, at least during parturition, in the following way: the point thus affected not contracting whilst all the others are in action, the resistance made by it would be wholly passive; and hence, whatever be its strength, it cannot hold out against the contractions of all the rest of the organ, the action of which, being aided by that of the abdominal walls, weighs with all its force, as it were, on that portion which does not participate in the general action; and if we suppose that any obstacle whatever prevents the child's ready engagement, the uterine effort, which is incapable of overcoming the resistance that the foetus encounters in clearing the superior strait, is felt at the point which does not contract, and consequently this latter becomes ruptured. And it is by a similar mechanism that the irregular or partial contractions may produce a rupture, by leaving some one point of the uterine walls in a state of inertia, whilst all the others are contracting.

During the travail, we must add everything that may render the labour difficult, or require any unusual and long-repeated contractions on the part of the organ. In this respect, all retractions of the basin, every tumor that obstructs the excavation, all resistances offered by the cervix uteri, whether dependent on an agglutination of the lips, a degeneration of its tissue, or on a state of spasm, or a considerable obliquity of the body, and the mal-positions, as well as the vices in the conformation of the foetus, may become the causes of uterine rupture.

2. *Determining Causes.*—A number of causes may serve to produce a rupture under the influence of some one of these predispositions; all of which, however, can be classified under two principal heads: namely, the external or traumatic, and the internal causes.

It is not without some hesitation that I venture to say a few words here about the traumatic lesions to which the womb is exposed as a cause of rupture; for it is well known that, at every period of life, this organ is liable to be injured by a projectile thrown by gunpowder, by any murderous instrument, or by the horn of an infuriated animal. But it must be remembered that the augmented size of the organ, during gestation, exposes it then more than ever to this variety of lesions; though the consequences and the indications for treatment are, in other respects, nearly the same. Again, we must add that perforations and lacerations of the uterus often result from ill-directed obstetrical manipulations.

The matrix is also greatly exposed to a compression or violent contusion of its walls, when it is developed by the product of conception. This compression may be mediate, that is to say, dependent on exterior causes, such as falls or blows on the abdomen, the pressure of this region by the backing up of a coach against a wall, or the passage of its wheels over the belly; or it may be immediate,

that is, due to the violent contraction of the abdominal muscles. The effects of compression are generally of little consequence, owing to the mobility of the uterus, the suppleness of its walls, and the *point d'appui* which the latter find in the surrounding parts. Nevertheless, they may be felt; for it is stated, in the old *Journal de Médecine*, that a woman had a rupture of the womb at the seventh month of her gestation, in consequence of having been pressed between a wall and a carriage. As before stated, the contusion of the ventral parietes seldom produces an immediate rupture; but the bruise and consecutive inflammation in the uterine structure may determine an ulceration, and then a perforation at some future period.

The ruptures by immediate compression, or those which result from the violent contraction of the abdominal muscles, seldom occur without the pre-existence of some one of the alterations in the uterine walls, considered above as predisposing causes. They generally follow a fit of coughing, sneezing, or vomiting, or take place during a paroxysm of anger; but they may likewise be occasioned by the patient's attempts to raise some burden, and by the forcible reversion of the body, which latter cannot occur without the recti muscles of the abdomen becoming closely approximated to the vertebral column during the forward curvature of the trunk; because, in all these movements, the matrix is found forcibly compressed between the abdominal muscles, which contract vigorously, and the posterior plane of the ventral cavity. A rupture has been known to occur at all stages of gestation, from the earliest months up to full term, under the influence of some one of these causes.

Authors have incorrectly considered the enormous distension of the uterus during pregnancy as being capable of producing a rupture; for, although this distension is a predisposing cause, yet, however great it may be, it cannot of itself give rise to such an accident without the previous existence of an organic alteration. The same is true of the violent and convulsive movements of the foetus, whose impetus is too inconsiderable to occasion a rupture; and besides, the matrix is fully protected against its influence by the amniotic liquid and the suppleness of the walls.

During labour, the uterine contraction is the most frequent determining cause; and though the walls of the organ were altogether passive in the course of gestation, they here play the principal part in the production of the rupture. The child's active movements are as foreign to the laceration that takes place in parturition as to those that are produced pending the gravid condition. For, according to the observation of M. Duparcque, if this movement is effected during the relaxation of the walls, their suppleness and extensibility enable them to yield to this force; but if, on the contrary, it takes place while the contraction lasts, the resistance which they then present would require a far greater impetus to overcome it than any that can result from even a convulsive movement of the foetus. The contraction is therefore the sole determining cause; but, for it to produce a rupture, its action must be favored by one of the pre-

disposing circumstances before indicated, the influence of which is easily understood.

However, it must not be forgotten that a rupture of the womb has often occurred during parturition, from the imprudent manipulations made with a view of terminating the delivery. For how often has an application of the forceps, a resort to the version, or a difficult extraction of the placenta performed by inexperienced hands—how often have all of them been followed by the early death of the patient, and a laceration of the organ has been detected at the autopsical examination! In fact, cases of the kind are mentioned by nearly all the authors; and Madame Legrand, the mid-wife in chief of *la Maternité*, informed me that many women are brought to the hospital every year to die, the victims of such attempts made in the city. I have seen a uterus whose lower two-thirds and the right portions of its body had been torn away by the embryotomy forceps; and, in another case, I found at the *post-mortem* examination a perforation in the right superior part of the body of the womb, produced by the attempts which a practitioner had made to separate a firmly adherent placenta. Facts of this nature cannot be repeated too often, for they are calculated to render young physicians, who intend to practice midwifery, more cautious; and to convince them that, to have attended two or three women in labour is not all that is needed in order to render them capable of performing the most difficult operations of our art.

§ 2. SYMPTOMS.

The signs of uterine rupture are easily made out; for most frequently the laceration takes place after some violent effort that has necessitated a forcible contraction of the abdominal muscles. It is manifested by an exceedingly sharp pain just at the point where the accident occurred, which makes the patient scream out from the intensity of suffering. This acute, or, as Desormeaux describes it, agonizing and crampy* pain, is accompanied by a sound of tearing or cracking, loud enough, in some cases, to be heard by the surrounding persons. This pain soon changes to a sensation of numbness, and it is followed almost immediately by swooning; the patient becomes pale, her pulse sinks, and she falls into a state of syncope. These primary phenomena are the only ones that are manifested when the pregnancy is not far advanced, and when the uterus has not ascended out of the excavation; or, indeed, when the ovum, having engaged in the lips of the wound, plugs it up in such a way

* According to Dr. Robertson, when a rupture takes place in consequence of a retraction of the basin, it is preceded by crampy pains and a sensibility to pressure at a circumscribed point of the hypogastrium. This crampy pain is caused by a compression of the uterus between the child's head and the promontory of the sacrum, or some other prominent osseous part. A pain of this nature existed in a high degree in a woman, in whom the anterior lip of the cervix uteri was considerably tumefied, and was also situated much lower than the head; Dr. Robertson succeeded in relieving it, by pushing up the tumefied lip during the interval between the contractions.

as to prevent any effusion into the abdominal cavity. A deceitful calm may thus succeed the storm, and the symptoms be only renewed after several hours, or even days, when the uterus, by contracting, shall expel the parts it encloses into the ventral cavity. In the opposite case, and more especially in the advanced stages of gestation, we can readily detect the softening and depression of the hypogastric walls by an examination of the patient; for, instead of feeling the hard, globular tumor formed by the womb in this region, we simply find the yielding, compressible walls of the abdomen, and under them the more or less reduced and distorted uterine globe. The patient who, at the instant of rupture, or shortly after, experienced a gentle heat diffusing itself through the abdomen, now feels some strange movements, or an unusual weight at a point where she never had them before; and the accoucheur himself detects the presence of the child in a spot where it should not be, and he can now distinguish its movements and the prominences it offers much more clearly than usual. But these active motions of the foetus soon cease to be apparent, though their final disappearance is ordinarily preceded by an unusual and an almost convulsive agitation; most generally, a little blood escapes from the vulva, in consequence of the detachment of the placenta, but this phenomenon may be wanting, especially in first pregnancies. Where the accident occurs during labour, the pains, that were hitherto strong and energetic, disappear at once.

The most conclusive signs are furnished by the touch: thus, during gestation, the finger can recognize the change in the womb's position, and the want of volume which it generally has at the stage of pregnancy the woman supposes herself to have arrived at; and sometimes it will even detect one part of the foetus situated externally to the womb, and depressing the upper part of the vagina. Pending the labour, it finds the bag of waters to become suddenly depressed, or no longer projecting through the os uteri, and yet without the escape of any liquid by the vagina. The presenting part of the child, which, a few moments before, was accessible to the finger, has now gone up, and perhaps has disappeared altogether; the cervix uteri has shrunk up, and the orifice is much less dilated than it was previously.

If an attempt be then made to pass the hand into the uterine cavity, perhaps it will find this cavity wholly obliterated by the retraction of the walls; or possibly it may encounter the intestines there, or else only a part of the foetus, the rest having escaped into the belly. The seat and extent of the laceration can thus be determined, and, in some instances, the hand may even be made to penetrate through into the abdomen.

When all these phenomena are met with, there can be no doubt with regard to the nature of the accident, but it is not always possible to recognize them so clearly; for if the child, instead of being displaced, remains in the cavity of the womb after the rupture, it may happen that the signs furnished by the vaginal touch, and the abdominal palpation, will be altogether wanting.

Under such circumstances, the diagnosis is very difficult, and most frequently the autopsy can alone determine the true cause of death.

§ 3. PROGNOSIS AND TERMINATION.

The prognosis of uterine ruptures is exceedingly unfavorable; for they nearly always prove fatal to the child, and they likewise expose the mother to an almost certain death. Nevertheless, its gravity varies according to the extent and the seat of the lesion, and the consecutive phenomena to which this gives rise.

Some cases have been reported in which the great disorder in the organism produced by the rupture, and the escape of the blood, waters, and foetus into the abdominal cavity, has caused the woman's instantaneous death. But, most generally, some particular phenomena, or symptoms, occasioned by the accidents consecutive to the primary lesion, precede the fatal termination; which latter may result either from hemorrhage, from the inflammations and suppurations created by the prolonged sojourn of a foreign body in the peritoneal cavity, or from the operations necessary for its extraction.

A. *Hemorrhage*.—Flooding is the most frequent, and at the same time the most speedily fatal, of all these accidents. Its source is evidently in the torn vessels of the womb, especially where the rupture takes place at the point of the placenta's insertion; but when this point remains intact, it principally comes from the utero-placental vessels which have been torn by the detachment of the after-birth; since the margins of the rupture, when this occurs at some distance from the placenta, usually furnish but little blood. As a general rule, only a small quantity of it reaches the exterior; while, on the contrary, it is effused abundantly into the belly along with the amniotic waters and the child's trunk (which has passed in a great measure into the peritoneal cavity), and the whole distends the abdomen enormously. Again, this effusion is equally profuse in those cases where the waters have escaped, and the infant lies in the matrix in such a way as to prevent its issue through the os uteri; because, the ruptured margins being hindered by the contraction from coming together, the lacerated vessels continue to pour out their blood, until the hypogastric walls oppose a resistance to the effusion, which is always too late to prevent death; and the latter may thus take place without being preceded by any sign that would lead us to suspect the rupture. Again, it may happen, even when the accouchement is terminated immediately, that the contraction is not sufficiently energetic to obliterate the calibre of the vessels entirely, and the hemorrhage continues long enough to destroy the patient.

The effusion ordinarily takes place into the sac of the peritoneum: but when this serous tunic is not implicated in the solution of continuity, the blood infiltrates between it and the uterus, and gains the duplicature of the broad ligaments, and may thus get into the cellular tissue of the basin and loins. In such cases, a layer of black blood is found interposed between the peritoneum and the womb, where the effusion, by becoming exactly modelled on the external

surface of the organ, assumes its form, and may thus by its livid color be mistaken for a gangrenous state of this viscus. (*Duparcque.*)

Nevertheless, the uterus may be ruptured, without this accident being necessarily followed by a profuse hemorrhage; as where the laceration takes place at a point which is moderately provided with vessels, in the vicinity of the neck, for example. Or, on the other hand, it may happen that, the ovum remaining intact after the accident, the fissure becomes filled up in a measure, either by a portion of the membranes or placenta, or a part of the child; or, the trunk of the infant may be partly driven into the abdomen, and the borders of the laceration become so retracted around it that the salutary compression thereby produced prevents a continuation of the hemorrhage. Again, when the entire ovum passes rapidly through the fissure into the peritoneal cavity, the uterus prevents or at least diminishes the bleeding by contracting at once, whereby a powerful obstacle to the further discharge of blood is created.

b. *Inflammation.*—When the patient does not die from the loss of blood that immediately follows the rupture, the presence of foreign bodies in the cavity of the peritoneum gives rise to an inflammation of this membrane, which is the more serious as they are the larger; and even where the accoucheur has succeeded, by any mode whatever, in removing the foetus and after-birth, an inflammation, though less to be dreaded, may still result from the operation or measures necessary for this extraction, which may speedily terminate by death.

c. *Escape of an Intestine through, and its Strangulation in, the Fissure.*—A considerable portion of the intestine has been known to constitute a hernia through the laceration in the uterus, and to become strangulated by the retraction of the organ. This accident would not be suspected, if the foetus were still enclosed in the matrix, or if this latter had completely retracted, but, nevertheless, it might occur immediately after the delivery; and should such an accident escape detection, it would infallibly terminate by death, as occurred in the case reported by Percy, and reproduced by M. Denoux. Consequently, whenever there is reason to suspect a rupture of the womb, it is necessary to carry the hand up into the interior of the organ as soon as the delivery is effected, and (following the course of Rungius) to press back the intestines into the abdomen, and then keep the hand in the uterine cavity until this organ is sufficiently retracted, and the fissure diminished, to prevent a return of the hernia.

d. *Recovery.*—However, some women have recovered from all these dangers; a few have even undergone gastrotomy, and have survived the consecutive accidents; while in others, the foetus and its appendages have escaped bodily into the peritoneal cavity, and have there given rise to inflammatory symptoms which gradually passed off, and then salutary adhesions have formed, as a consequence of these inflammations, whereby the foetus and its appendages have become enclosed in a pseudo-membranous cyst that isolated them from

the surrounding parts; the latter became habituated to this new vicinage, which has persisted for a variable period, and sometimes even throughout life. But this cyst, like those which surround other extra-uterine products, may become the seat of a fresh inflammatory action; its walls contract new adhesions with neighboring organs, and we sometimes find ulcerations and perforations, after the lapse of many years, by which the cavity of the cyst communicates with that of the intestine or bladder, and the last pieces of the skeleton are finally expelled through the urethra, the rectum, or the œsophagus.

Where the child remains in the uterine cavity, notwithstanding the rupture, and the contractions do not immediately expel it by the natural passages, the same phenomena may be subsequently manifested; that is, the inflamed and ulcerated uterine tissue contracts adhesions either with the abdominal parietes or with those of some adjacent organ, and the foetal debris then escape through the ulcerated and perforated wall, or else by the excretory organs. (*Duparcque.*)

§ 4. PATHOLOGICAL ANATOMY.

Every portion of the uterus may become the seat of rupture, though there are some parts which are more liable to be affected than others; such as the inferior regions, the fundus, and the lateral portions of the body, and the superior or supra-vaginal parts of the neck. Moreover, the seat of laceration varies according to the cause that has given rise to it, as also to the period at which it takes place; thus, during gestation, the body is most likely to be ruptured, but pending the travail, on the contrary, these solutions of continuity are met with about the neck or inferior portion of the body, which is in general thinner, and not so well sustained as the rest of the organ. Where the accident has resulted from some external compression, the walls usually become lacerated towards the lateral parts; when it has resulted in consequence of a contusion, the bruised point is ordinarily the one that afterwards gives way: and if the rupture has been preceded by any organic alteration, the laceration takes place at the diseased point. The front and back walls being protected by the anterior and posterior planes of the abdomen, would seem to be perfectly sheltered from such accidents; this, however, is not always the case, for instances have been reported which prove the possibility of ruptures of this kind. According to Dr. Robertson, when the laceration is caused by a narrowness of the pelvis, it may occupy any portion of the womb, though more frequently, perhaps, it involves its posterior inferior part; which is explained, in his opinion, by the pressure that the sacro-lumbar prominence makes on this region. Sometimes, also, it takes place in the anterior-inferior part, and is then due to the osseous projections located on the internal face of the pubic symphysis. The anterior-superior wall is more often injured by foreign bodies; indeed, it is the almost exclusive seat of ruptures produced by wounds.

Nothing can be more uncertain than the extent, form, and direc-

tion of the uterine ruptures; since they vary in size, from a little hole that is scarcely capable of admitting the end of the finger, up to a large fissure which extends over two-thirds of the fundus, or periphery of the neck, or, indeed, occupies nearly the whole organ. It may have a longitudinal, a transverse, or an oblique direction, or it may affect a circular form, as often happens about the neck; or it may run in a straight line, or in a zigzag course. The divided margins are rarely observed to present a clear and regular section; but, instead, they are most usually found unequal, haggled as it were, contused, and ecchymosed to a more or less considerable extent. If the rupture has resulted from some organic alteration, the anatomical traces of the previous disease are found at the affected point. Lastly, if the patient has not died till several days after the accident, the autopsical examination will verify the presence of the matters effused into the peritoneum, and the unequivocal marks of a violent inflammation in this serous membrane; besides which, the borders of the uterine fissure will sometimes be red, livid, and inflamed, and occasionally even gangrenous.

The lacerations of the womb do not always implicate the whole thickness of the organ, for the tunics, that enter into the composition of its walls, do not all possess the same degree of elasticity; and hence it is possible they may be ruptured separately. For example, Madame Lachapelle says, a fissure of the orifice propagated to the neck, and even to the body of the organ, has very often divided the whole muscular layer, leaving the serous membrane intact. I have particularly observed, she continues, fissures of this kind on the sides of the womb which were covered by the duplication of the broad ligament, whereby the wound was prevented from extending into the abdomen. M. Duparcque furnishes a very similar case; and Doctor Collins reports nine others in which the peritoneum was not injured, though the muscular layer of the neck was lacerated to a considerable extent. I have likewise had an opportunity of observing an identical instance in the practice of Professor Velpeau, in which I was enabled to verify the truth of the remark made by M. Cruveilhier; namely, that the laxity in the adhesion of the peritoneum to the cervix, and to the sides of the uterus, fully explains why this membrane is so rarely involved in those cases where a considerable rent has occurred in the neck, and why the effusion of blood then takes place between the uterine tissue and the peritoneal serous membrane.

In some more rare cases, the muscular structure resists, and the peritoneal layer alone gives way. Where this occurs, the disease can scarcely be recognized during life, for the phenomena that precede death are either those of a hemorrhage, or of a violent peritonitis; but a large quantity of blood is ordinarily detected at the *post-mortem* examination, and, by searching for its source, one or more fissures of a variable extent are found in the uterine serous membrane. To the case of this kind reported by Ramsbotham, we can now add several others that have recently been published; one of the most curious of which is that furnished by H. Partridge (*Arch.*

de Méd. t. 19), where a great number of lacerations that ran transversely, were found at the *post-mortem* examination; these were more or less curved, and were variable in depth, and they extended from half an inch to two inches in length. A shred of peritoneum had been completely detached and hung within the abdomen, thus laying bare the naked fleshy tissue from which it had been torn.

§ 5. TREATMENT.

The measures that have been proposed for the treatment of ruptures of the womb, may be designated as the prophylactic and the curative. The object of the former is to avert the influence of the causes that have been described as predisposing to this accident; and we refer for an account of those whose existence it is possible to foresee, such as the divers obstacles to labour, to what has already been said on this subject; and with regard to the others, as it is usually impossible even to suspect their presence, we shall pass them over altogether.

A rupture of the uterus is only serious from the disastrous consequences which follow it; therefore, the prophylactic measures must be directed, not against the rupture itself, but rather against the consecutive accidents to which it gives rise. The best mode of preventing them is to facilitate the retraction of the organ by immediately extracting the foetus and its appendages; for it has been shown that it is the hemorrhage, and the inflammatory symptoms which follow the child's displacement and subsequent sojourn in the cavity of the abdomen, that are to be particularly dreaded.

Perhaps the indications for treatment presented under such circumstances will be best illustrated by supposing the rupture to take place at three different periods of the puerperal state, namely: during the parturition; during the latter months of gestation; and during the early stages of pregnancy.

1. *During the Labour.*—In this case, the infant may either remain within the womb or it may have been driven out of the uterine cavity.

A. If the child remains *in situ*, its extraction, either by the pelvic version or by the forceps, is of course the only admissible operation. But where any obstacle appertaining to the pelvis or the soft parts opposes its delivery by the natural passages, gastrotomy ought certainly to be performed if the infant is living and viable, and craniotomy when it is dead, or when it has suffered severely from the slowness of the travail.

B. If one part of the child has passed into the abdominal cavity through the fissure, while the other portion of it is still enclosed within the uterus, we must endeavor to deliver it by the natural passages, by acting on the portion retained in the womb, or which has already engaged in the os uteri or vagina. But if the presenting part is high up, and the hand or instruments cannot get a sufficient hold upon it, it will be necessary to search through the fissure after the feet, and bring them down into the vagina. But here another difficulty arises, for the escape of the waters and a part of

the fœtus may have determined a contraction of the matrix, and the lacerated margins, participating in this retraction, may be found so closely applied on the child's trunk as to render a passage of the hand impossible ; under such circumstances, we might follow the example of certain accoucheurs, and open a passage by enlarging the wound in the uterus with a cutting instrument.

c. Supposing the child has passed into the abdominal cavity, and that the organ has not as yet retracted, the os uteri is sufficiently dilated or dilatable, and the uterine fissure is still large enough to permit the hand and fœtus to pass through (which conditions are scarcely ever met with when the rupture occurs at the cervix), we ought, as in the preceding case, to go after the feet in the ventral cavity, and bring them back through the lips of the wound, the neck of the uterus and the vagina, and thus extract the fœtus by the natural passages. After this delivery, the hand should again be introduced into the uterine cavity for the threefold object of extracting the after-birth, of determining the organ's retraction, and of preventing the strangulation of a loop of intestine, if any portion of this had engaged in the fissure.

In those cases where such a manœuvre is impossible, the only resource is in the Cæsarean operation ; unless, being fearful of the disastrous consequences of this operation, the accoucheur should conclude to abandon the fœtus in the peritoneal cavity, and allow the mother to run all the dangers to which this determination must necessarily expose her. If the child's death were positively ascertained, the arrest of the hemorrhage might perhaps authorize this latter procedure, more especially if he should not see the patient until several hours after the accident ; but it would never be excusable if the infant were living, and if he were not satisfied that the uterus, by being completely retracted, had obliterated the vessels which furnished the blood ; for, otherwise, gastrotomy should be resorted to at once.

2. *During the latter Months of Gestation.*—Here, likewise, the extraction of the ovum is the wisest course to pursue ; indeed, it is imperiously indicated when the child is living, and the pregnancy has advanced beyond the seventh month ; and it may be accomplished by resorting either to gastrotomy, to a forced dilatation of the os uteri, or to incisions made directly on the neck of the womb. The Cæsarean operation will be preferred whenever the fœtus is displaced ; but if it is still resident in the uterine cavity, we must endeavor to dilate the os tincæ artificially, which will generally be feasible when the patient is near term, more especially if she has previously borne several children ; and the introduction of the hand might likewise be facilitated by incising the periphery of the cervix. But these tentatives ought to be made with the greatest care, and, should they offer any serious difficulties, and require too much time, we must renounce them at once, and open a passage through the abdominal wall.

3. *During the early Months of Gestation.*—Most of our leading teachers advise us to abandon the patient in these cases to the re-

sources of nature, to abstain from all operations, and to be content with combating the consecutive symptoms as they arise. Three new indications are now presented, says M. Duparcque, namely : 1. To prevent or arrest the disorders of innervation, by raising the morale of the woman, who is instinctively struck with fears and inquietudes, and by administering the diffusible antispasmodics by the mouth, the skin, or the respiratory passages ; 2. To combat or prevent the hemorrhage by abdominal compression, by refrigerants, compression of the aorta, etc. ; and, 3. To prevent or combat the inflammation, which ordinarily follows the displacements of the ovum, by the employment of local and general antiphlogistics.

Of Ruptures of the Vagina.—The walls of the vagina may also be lacerated during the accouchement. But, owing to the differences that exist, according to the portion of the canal these ruptures may occupy, it has been customary to study separately the lacerations at its upper and lower extremities, and at its middle part.

In general, the two latter are of little consequence, or at least, the dangers and indications they present belong rather to the province of the surgeon than the accoucheur; for, with the exception of thrombus of the vulva, which may, as stated (page 491), require the intervention of art during labour, all the other lacerations are only unfavorable to the woman, inasmuch as they expose her to vesical or recto-vaginal fistulas, which do not claim our attention here. On the contrary, the lacerations that occupy the superior extremity of the vulvo-uterine canal, require a cursory notice, because they, like the ruptures in the lower part of the uterus, may become the sources of dystocia. The lacerations at the upper part of the vagina may result either from traction or from direct pressure. The former may be owing to the uterine contraction, to the artificial return of the matrix or presenting part of the child, and to every act of the abdominal walls, and every movement of the trunk, calculated to rectify or draw up the womb. According to M. Duparcque, the uterine contraction alone may produce a transverse laceration of the vagina in the following manner: The child's head being wedged in at the superior strait, or else being more or less engaged in the excavation, and unable to advance any further in consequence of the resistances it encounters, and the matrix still continuing to contract, the latter withdraws itself, as it were, from the infant. The margins of the orifice are gradually drawn up towards the fundus of the organ, whereby they get clear of the head in a great measure, and sometimes altogether. Whence it happens that the vagina becomes subjected to an active traction, proportioned to the energy of the uterine pains; and consequently, as it only offers a passive resistance to the distension and compression it undergoes, it is gradually enfeebled, and ultimately gives way.

The mode in which the efforts sometimes made during the version for the purpose of pressing up the presenting part, or for penetrating through the os uteri by main force, so as to carry the hand towards the fundus of the organ, act in the production of these lacer-

rations, is easily understood. And this transverse rupture, having once commenced, may extend far enough to separate the uterus almost entirely from the vagina. As to those fissures and vaginal perforations which result from direct pressure, they are ordinarily produced by an improper application of the forceps, or by the head's prolonged sojourn at the superior part of the excavation.

The signs of this rupture, and the accidents to which it gives rise, are very similar to that of the uterus, excepting that they are less intense and not so dangerous. The pain is less acute at the time of its occurrence, being sometimes even confounded with the labour pain; and the existence of a laceration is only suspected, some time after, when searching for the cause of the arrest of the labour. Here, likewise, the infant may either preserve the place it occupied or may pass partially or wholly into the abdomen. Most generally there is no displacement when the head had previously engaged in the excavation, and the rupture has taken place either at the junction of the vagina with the cervix or else at some point higher up than where the head is found. Nevertheless, should the laceration be very extensive, the head may remain fixed in the excavation, while the trunk is carried back into the ventral cavity by the subsequent retreat of the matrix; the orifice of which, being no longer retained by the vaginal connections, mounts up and retracts towards the fundus of the organ, thus abandoning the foetus which it cannot expel. It seldom happens that the whole child escapes into the abdomen, and, when this does occur, it always results from pushing up the head during the ill-directed efforts to effect the delivery. But, whether this passage is partial or complete, it ordinarily takes place in such a way that the pelvic extremity engages first in the lacerated orifice.

The prognosis is much less unfavorable than that of uterine ruptures; because there is far less danger from the hemorrhage and consecutive inflammations, and, besides, it is always possible to extract the foetus by the natural passages.

This extraction through the vagina is the only indication which then presents. If the head remains in its place, the forceps must be applied; but where any other part presents, we must search after the feet through the rent in the vagina, which is to be enlarged with an instrument, if it be not free enough or should offer any resistance. The Cæsarean operation ought only to be resorted to, even when the foetus has passed wholly into the peritoneal cavity, in those cases where a retraction of the pelvis renders its delivery through the natural passages absolutely impossible.

CHAPTER IV.

RHEUMATISM OF THE UTERUS.

RHEUMATISM of the uterus, although studied for a long time in Germany, was scarcely known in France, until M. Dezeimeris published in his journal (*l'Expérience*) a series of facts that were previously known to, and put forth by, the German authors. About the same time, M. Stoltz, who was acquainted with the works of our neighbors on the subject, devoted particular attention to this affection at the Clinical Hospital of Strasbourg, and communicated the result of his observations to his pupils. One of them, Dr. Salathé, has quite recently defended a thesis on this subject; and from his work, as also from the bibliographical researches of M. Dezeimeris, I extract the following account of this disease, which is unknown to the French nosologists.

According to Radamel, rheumatism may attack the uterus in the non-gravid state; but we have only to study it here as occurring in pregnant females, in whom it may appear at all stages of the puerperal condition. And, therefore, after some general remarks on the disease itself, it will be necessary to point out the influence that it may have over the gestation, the parturition, and the lying-in.

Causes.—Every circumstance calculated to favor the development of the rheumatic affections in general, may likewise prove a source of rheumatism of the uterus: thus, for instance, a momentary or a prolonged exposure to cold and moisture, inadequate clothing, or sudden changes from a very high to a very low temperature, and all those other atmospheric constitutions which have been enumerated by medical authors, either as predisposing or as determining causes of rheumatism, may likewise produce that of the womb. But, besides these general causes, there is one peculiar to the disease under consideration; that is, the susceptibility of this organ to the impression of cold under the attenuated integuments of the abdomen during the latter months of gestation; for the belly is only covered at that particular point by very light clothing, and the lumbo-sacral region is often but imperfectly protected by the short jackets worn by the patient.

Symptoms.—A rheumatism of the uterus is very often manifested in persons who are constitutionally predisposed to the rheumatic affections; and it may coexist with a general disorder of the same nature, though in the majority of cases the womb, together with its appendages, and the adjacent parts, is alone affected. Again, it has oftentimes resulted from a sudden cessation of a rheumatic pain at some other point, which is speedily transferred to the uterus. But,

whatever may have been the mode of its attack, this disease exhibits some well-marked peculiarities by which it can easily be recognized. The principal symptom is pain, or a distressing sensation, which involves the whole or a part of the womb, without any violence having been made on the organ; its intensity varies from a simple feeling of heaviness to the most painful dragging sensation; and it may either occupy the entire matrix, or only one of its parts, such as the body, the fundus, or the inferior segment. When the rheumatism is fixed in the fundus uteri, the pain is particularly apt to be felt in the sub-umbilical region; it is augmented by pressure, by the contraction of the abdominal walls, and sometimes even by the simple weight of the bedclothes; and in many cases the patient is unable to bear any movement whatever. If seated somewhat lower, she suffers from acute dragging sensations, that run from the loins towards the pelvis, the thighs, the external genital organs, and the sacral region along the uterine ligaments. Finally, where the inferior segment participates in the affection, the seat of it can be detected by the vaginal exploration; which latter gives rise to the most acute sufferings. But, of all the causes that may exasperate these pains, there are none more distressing than the incessant movements of the child.

Like all rheumatic pains, those of the uterus are metastatic, and they occasionally pass rapidly from one point of the organ to another; often, indeed, they disappear at once, and pass off to some other organ. This is particularly apt to occur where the pain was originally located at some other point, and measures have been employed to recall the affection to the part primitively attacked.

They offer frequent and variable exacerbations in their duration and intensity, according to the stage of the disease; these are followed by remissions, during which the patient only experiences a vague sensation of weight in the part. The uterine pains are usually accompanied by a recto-vesical tenesmus, which is the more distressing as the former are the more energetic, and are seated nearer the inferior segment. The patient is then tormented by a continual desire to empty her bladder; the emission of urine is attended by a smarting sensation, and sometimes by acute sufferings, while at others it is even wholly impossible; and in many cases the attempts to move the bowels prove equally ineffectual. Most of the German authors attribute this double recto-vesical tenesmus to a rheumatic affection that is not always exclusively limited to the womb, but which also invades the neighboring organs. But M. Stoltz appears disposed to believe that it is rather the result of the close sympathy existing between these adjacent parts; for, if these new pains were occasioned by a rheumatism of the rectum or bladder, those of the uterus ought to disappear altogether, or at least they should become diminished. (*Salathé's Thesis.*)

Analogy would lead us to suppose that an unusual heat and tumefaction must exist in the affected parts; but the difficulties in detecting these characters are self-evident, although their existence is quite probable.

Such acute pains, seated in so important an organ, would naturally produce a considerable general reaction; and it is found that this disease, like the greater number of the inflammatory affections, most usually commences by a slight chill, which lasts for a quarter of an hour or twenty minutes; the fever that follows it diminishes, and sometimes disappears altogether, during the interval between the paroxysms; but, pending their duration, it is usually quite intense, the pulse is frequent and hard, the face excited and flushed, and the tongue is red and dry; the patient complains of thirst, the skin is hot, and she often suffers from an extreme agitation and restlessness. Towards the end of the paroxysm, a profuse perspiration generally breaks out, which seems to be the prelude of a notable amelioration. Then these general phenomena become moderated, together with the uterine pain, but they reappear with the latter, after a variable period, ranging from a few hours to several days.

1. *Influence of Rheumatism over the Progress of Gestation.*—The paroxysms are apt to be followed by the uterine contractions in those cases where they have persisted for some time, or have been very severe; and in this manner they may serve to bring on a premature delivery. The patient experiences some acute and tensive pains, but this feeling of tension is not uniform; for it attains, in turn, a high degree, and then becomes weaker in the same proportion, progressing in this way with shorter and shorter intervals. At first, the uterus is indurated to a partial extent, but afterwards throughout; the os uteri dilates, though its dilatation is at first slow and difficult, and its ulterior progress does not seem to correspond with the intensity of the pains. An abortion is then imminent, but it is far from being so frequent as might be supposed; and when it does occur, it is more frequently observed in the febrile than in the apyretic form of rheumatism. The orifice has been known to dilate to the extent of an inch in diameter, and then the bag of waters, that had previously engaged in this opening, insensibly retreated, the os uteri again closed up, and the accouchement did not take place. Consequently, so long as the dilatation of the os uteri does not amount to two inches, we may reasonably hope to make the travail retrograde. These uterine rheumatic pains may simulate those of parturition, and thus lead the accoucheur to suspect that the travail has regularly commenced, when in fact such is not the case. The characters of the rheumatic pain, furnished in the following paragraph, will aid in preventing such an error. It is probably to some mistakes of this kind that we must refer those pretended instances of prolonged gestation, as well as those cases where the genuine travail of parturition was developed, and afterwards suspended during several weeks, and even months.

2. *Influence of Rheumatism over the Labour.*—As a general rule, a rheumatic affection of the womb retards the progress of the travail, and sometimes even renders the child's spontaneous expulsion wholly impossible. Besides the general phenomena already pointed out, the disease here gives rise to the following peculiarities:—

1st. It is well known that the normal uterine contraction only

begins to be painful when it has accomplished the greater part of its course, and when it is at the moment of distending and dilating the uterine orifice; in other words, the true labour pain only commences at the instant when the impetus of the body of the womb overcomes the resistance on the part of the neck. In rheumatism, on the contrary, the uterine contraction is painful from the very first, and prior to any action exercised on the cervix; hence the cause of the pain is not in the violent distension of this orifice, but rather in the uterine contraction itself, in the other morbid conditions, and in the altered relations of the nerves and contractile fibres of the uterus.

2d. In a normal accouchement, the contractions begin at the fundus, and terminate at the inferior segment of the matrix; in rheumatism, instead of starting at the fundus, they begin in the painful point, and are not regularly propagated towards the cervix. Again, the rheumatic pains exist prior to the contraction of the womb, and they speedily acquire a high degree of intensity under the influence of this latter. At times, their violence promptly arrests the contractions, even before they have traversed their ordinary cycle. They are then rapid, short, and become more and more distant.

3d. Towards the end of labour, at the time when the uterine action ought to be aided by the voluntary contraction of the abdominal muscles, the woman refrains from exerting these under the fear of augmenting the pains, whereby an excessive slowness in the travail results. The patient is found in a state of extreme anxiety, and the frequency of her pulse, the heat of the skin, the thirst, and vesical tenesmus, are all greatly augmented. Where these sufferings are much prolonged, she falls into a state of swooning, which often proves serviceable, as the pains are suspended while it lasts; a profuse perspiration has then been observed to take place, which had the most salutary influence over the ulterior progress of the parturition. But at other times the uterus becomes more and more painful, and it is rather in a state of permanent contraction, or of fibrillar vibration, than of normal contraction; the pulse is accelerated, and the woman is threatened with a metritis, which renders the accouchement extremely painful.

3. *Influence of Rheumatism over the Puerperal Functions.*—The reader will anticipate from the foregoing, that a rheumatism of the womb may prove a source of difficulty in the delivery of the after-birth, by determining some irregular or partial contractions of the organ immediately after the child's escape; but that subject does not claim our attention at the present time, and it will be reverted to hereafter. In the healthy state, the uterus retracts after the accouchement, and thereby prevents the development of hemorrhage. But in rheumatism, this retraction of the organ is very imperfect, and it remains enlarged above the pubis; the after-pains are then very distressing, and are prolonged for some time; the uterine vessels are less compressed than usual, and profuse floodings may thence result. While, on the other hand, the organ's state of suffering diminishes both the lochial discharge and the lacteal secretion; and

this, together with the persistence of the abdominal pains, and a manifestation of the phenomena of a general reaction, may be mistaken for a peritonitis which does not really exist.

Prognosis.—Rheumatism of the womb is not a disease capable of determining the loss of the mother's life; nevertheless, from the pain that it occasions, and the errors it may give rise to in practice, it does not the less merit a careful study; because, during pregnancy, it may prove to be a source of abortion, and, though it is not often manifested until after the sixth month, yet it is always an unfavorable circumstance to the child to be born before term. We have already spoken of the unfortunate influence it may have over the course and character of the labour pains; in fact, it has often rendered an artificial delivery imperative. It may also complicate the delivery of the after-birth, and disturb the order of the phenomena that constitute the lying-in. At that period it has often been mistaken for the true inflammatory symptoms; and, consequently, it has been combated by measures that were more dangerous than useful.

As regards the period of manifestation, it is generally more unfavorable when it occurs at an early stage of the gestation; both because it then has a greater influence over the pregnancy, which has not become firmly established, and because it has a tendency to return several times before term. Besides which, most women, who have been affected during the gravid state, likewise find it to reappear again in the course of their parturition, which is thereby rendered laborious.

Treatment.—1st. The measures that have most frequently been attended with success when administered for this disease during the gestation are: general venesection; the intestinal revulsives, such as castor oil and ipecacuanha; bathing, narcotized lotions over the abdomen, opiated mixtures, and sudorific drinks; and, in those cases where the uterine affection had succeeded the sudden disappearance of a rheumatic pain in some other organ, the application of revulsives over the part primarily affected. 2d. During the labour, the same means are employed; but if they fail, and the degree of dilatation in the os uteri be such as to permit an artificial intervention, either the forceps or the version should be resorted to, according to circumstances. 3d. After the delivery, sudorific drinks, opiated unctions over the belly, and baths; and, when the lochial discharge has failed, leeches to the vulva, and ipecacuanha combined with opium.

CHAPTER V.

OF CERTAIN DISEASES THAT MAY COMPLICATE THE LABOUR.

INDEPENDENTLY of the various accidents just studied, which have a special relation to pregnancy and parturition, there are yet some other affections whose existence at the time of labour may render the accouchement difficult, or perhaps altogether impossible, without the intervention of art. Thus, for instance, a hemoptysis, a hematemesis, or an aneurismal tumor; asthma, syncope, the presence of a hernia, or the loss of strength in a woman who is enfeebled by some chronic disease, may individually complicate the delivery; and, therefore, they claim the accoucheur's particular attention.

A. When the patient under care happens to be affected with hemoptysis or hematemesis, and the hemorrhage is inconsiderable, there is nothing to be done; but if it does not abate, or if it suddenly augments in quantity during the pains of childbirth, we must endeavor to remove the patient from the danger that threatens her, by terminating the accouchement as soon as the dilatation or the dilatability of the os uteri will permit, by an immediate application of the forceps or the pelvic version, according to the particular conditions in which the parts of the child and those of the mother shall be found.

B. The same indications for treatment also present where the patient has a moderate-sized aneurism, more especially if it occupies one of the large vessels of the abdomen and chest. In fact, the reader must foresee how greatly the tumor would be exposed to rupture, during the violent strainings to which the woman involuntarily gives way during the second stage of the travail.

C. The same course is to be pursued in all cases where any considerable obstacle to the respiration is found to exist; as happens in asthmatic persons and in women of a small stature, in whom the uterus is so enormously distended as to press up the diaphragm and lungs towards the upper part of the chest, and in whom the respiratory functions have, on this account, been disordered during the latter months of pregnancy.

D. Where a hernia exists, every one must understand, says Desormeaux, what disastrous consequences might result from the violent throes of the latter stages of labour; and how much these tumors must then be exposed to an increase of size, and how liable they are to become strangulated. The accoucheur ought to prevent these accidents, by reducing the hernia as soon as possible, if it is reducible; endeavoring to return it during the interval between the pains; and, when the contraction comes on, he will make a strong

compression over the hernial opening by his fingers, or still better with some convex instrument, to prevent its coming down. But if it is irreducible, he should support the tumor with the palm of his hand, so as to prevent the expulsion of new parts during the pain. Finally, if, notwithstanding all these precautions (which the accoucheur ought to attend to himself, unless he has an assistant upon whom he can rely), the hernia becomes strangulated, he should immediately terminate the accouchement, as in the foregoing cases.

E. There are certain very delicate or very irritable females who are apt to fall into a state of syncope from the occurrence of the most trivial pain. In such cases, where the faintings are dependent either on a restricted diet, on a previous hemorrhage, or on some former disease, it is necessary to keep up the patient's strength by some light nutritive articles of diet, such as broth, and by a little generous wine or cordial. If these measures prove to be insufficient, and the swoonings are renewed so often as to threaten her existence, we must terminate the labour. However, this measure is not to be prematurely resorted to, for these syncopes may be owing to some trifling cause or nervous condition, without there being that extreme debility, which alone, says Gardien, can authorize this ultimate step to be taken. Desormeaux says, I have seen such faintings renewed at every pain, in a woman who was pregnant with twins; and they lasted throughout the interval from one pain to another, so that the patient was only aroused from that state by the effect of, and during the time of, the contractions; nevertheless, the accouchement terminated spontaneously and happily for both the mother and child.

Baudelocque gives the history of a woman who died during the travail after repeated syncopes; but the autopsy proved that these latter, as also the vomitings and diarrhoea that accompanied them, had been produced, not by the labour, but by the presence of a calculus, about the size of a small nut, in the gall bladder.

Dr. Davis relates a much more extraordinary case of the kind, since its explanation has to be sought for in the phenomena of the travail itself: a poor woman had been five hours in labour at the Charity Hospital; the membranes were ruptured, and a large quantity of the waters escaped, but from that moment the patient became excessively feeble; experiencing an urgent desire to empty her bowels, she seated herself on the vessel, and made some straining efforts, when she fainted away; the attendants immediately placed her in a horizontal position, and they had scarcely time to get her into bed before she died. Nothing whatever was detected at the autopsical examination that could give a clue to the cause of this sudden death.

SECOND DIVISION.

OBSTETRICAL OPERATIONS.

IN the preceding division we carefully detailed the various indications that are to be fulfilled in the divers causes of dystocia hitherto studied; each of which, as the reader has seen, requires a different operation. And we now propose to take up the consideration of these obstetrical operations in this second division of our fourth part.

CHAPTER I.

OF VERSION.

THE version is an operation by which one of the two extremities of the child is brought to the superior strait: it therefore exhibits two varieties, in one of which the operator proposes to bring down the feet, and hence this is called the *pelvic* or *podalic* version; while in the other he attempts to deliver by the head, which is on that account denominated the *cephalic* version.

The cephalic version was almost exclusively practiced from the time of Hippocrates until that of Ambrose Paré, that is to say, down to the latter half of the sixteenth century; although we ought to observe that Celsus and some others direct the feet to be sought after, and the labour to be terminated by the pelvic version, in those cases where it is too difficult to get hold of the head. But since the days of Paré, or rather since those of Guillemeau, his pupil, the pelvic version has been recommended as applicable to all cases; and the cephalic reduction was almost entirely forgotten, until towards the end of the last century, when Flamand, and, somewhat later, Osiander, exaggerating, doubtless, the inconveniences, the difficulties, and disastrous consequences resulting from the pelvic version, proposed a return to the precepts of Hippocrates; and suggested the cephalic one in almost all cases where the hand alone is sufficient to terminate the accouchement. The doctrine of the Professor of Strasbourg was favorably received in Germany, but it was severely criticised by the school of Paris. Indeed, Baudelocque scarcely speaks of it, and Gardien restricts its application to a very limited number of cases, while Madame Lachapelle formally rejects it. But we shall see hereafter, when studying the respective value of these two operations, that at the present day it would be improper to embrace either opinion exclusively; for some cases are better suited to the cephalic version, while there are others, on the contrary, where the pelvic one is alone practicable; consequently, both opera-

tions should be retained in practice, leaving to the judgment of the accoucheur to determine the cases where the one or the other ought to be preferred.

But, before studying the cephalic and the pelvic versions separately, we will point out, in a summary way, certain precautions that ought to be attended to, which are common to both operations, namely :—

1. Before everything else, the accoucheur ought to forewarn the patient of the operation he is about to perform, to make her understand as clearly as possible the necessity for resorting to it, and to calm her anxiety, and remove any fears as to the unfavorable consequences it may have either upon herself or the child.

2. As soon as the woman shall have consented to the operation, she is to be placed in a suitable position, which position varies very much in different countries, and even according to individual accoucheurs. The following is the one generally preferred in France: the woman places herself across the bed, one side of which rests against a wall or some tall piece of furniture; several pillows are then piled up under her back, so as to keep the upper part of the body moderately elevated; and so, likewise, that the patient's sacrum, by resting on the free side of the bed, may leave the vulva and perineum entirely exposed. The lower extremities are moderately flexed, the feet resting on two chairs, and supported by two assistants standing on the outside of the limbs. Where the patient is very intractable, or fears that she cannot control her movements, another assistant holds the pelvis in a fixed position by grasping the iliac crests.

In England, women are usually delivered on the side; and they are placed in the same position, whenever it becomes necessary to resort to any operation; the precaution being taken, however, to bring the breech to the side of the bed, and to place a cushion between the knees, for the purpose of keeping them apart.

3. As the little bed on which women are delivered is often too low, and therefore incommodious for the operator, some practitioners direct a mattress to be placed on a "commode" or any other article of furniture of a proper height, to which the patient is to be transferred. In many cases, the accoucheur will, no doubt, be obliged to go down on his knees or sit on a low chair, which position is often inconvenient; but, after all, it does not render the operation itself much more difficult, and it is far better for the operator to be a little annoyed than to frighten the patient by all these preparations. I repeat, that to turn the bed in such a way that one of its sides will be supported against the wall, and to place the woman crosswise on it, taking the precaution, if necessary, to elevate her breech by slipping a pillow under the first mattress, is such a simple affair, that she will scarcely perceive it, and it will not disturb her in any way.

The accoucheur ought to throw off his coat, as the forearm has to be introduced into the parts as far up as the elbow. He should, also, put on an apron to protect himself from the discharges that escape from the woman's organs; and he will, likewise, have a proper

number of napkins prepared and placed at the foot of the bed to wipe his hands, and to envelop the child's trunk as it shall be extracted.

4. Before operating, he should again ascertain the child's position. We need only refer here to the diagnostic signs in each presentation, that have been pointed out in describing natural labour.

5. The position being clearly recognized, it will be necessary to decide on the choice of the hand, by which the version is to be performed. In the presentations of the vertex, face, and breech, we introduce that hand, which, being held midway between pronation and supination, has its palmar surface turned towards the child's anterior plane; while, in those of the trunk, we introduce the hand having the same name as the presenting side of the foetus (the right hand for the right side, and the left hand for the left one), whenever we intend to perform the pelvic version. As to the cephalic version, it is difficult to lay down any general rule for the particular hand to be used, since this varies according to the particular case.

The hand and forearm chosen are then covered by some fatty substance, with a view of facilitating their introduction, and, at the same time, of protecting them against the contagion of any diseases the woman might be affected with. But it is only necessary to grease the dorsal surface of the hand, which alone comes into contact with the mother's parts, the palmar face having to apply itself to those of the foetus which are too slippery already.

6. In those cases where the version is rendered indispensable by some accident that threatens the life of the mother or child, and, consequently, where it is not possible to choose our own time, we evidently have to operate as soon as the gravity of the case renders it advisable: but in those where a mal-position of the infant constitutes the whole difficulty, as in the trunk positions, for example, the operator (if attendant on the patient from the commencement of her travail) should bear in mind that, when the bag of waters is still intact, or else so recently ruptured that a considerable quantity of water still remains in the uterine cavity, the introduction of the hand and the evolution of the foetus are much easier than at any other time; and consequently he ought to select that moment for operating, provided always the os uteri is sufficiently dilated.

ARTICLE I.

OF THE CEPHALIC VERSION.

The cephalic version is an operation whereby it is proposed to bring the summit of the head to the superior strait. This operation has been recommended under very opposite circumstances; and by way of designating the cases in which it may be resorted to with advantage, as also for the better appreciation of the various opinions that have been given on this subject, we shall successively

examine the cephalic version under the following heads: 1st. In the inclined positions of the summit and face, which, from not having been reduced to free positions, under the influence of the uterine contractions, constitute an obstacle to the spontaneous delivery. 2d, in the face positions; 3d, in those of the trunk; and 4th, in the positions of the breech.

In irregular Vertex and Face Positions.—We have already stated, on page 545, *et seq.*, what is requisite to be done when this irregularity in the presentation is not corrected spontaneously. The operation resorted to is not, properly speaking, a version; it is a simple correction by which the primitive position is rectified, but not changed. And we have nothing further to add to the indications then given.

In Presentations of the Trunk.—It is well known that trunk presentations can only terminate in a delivery, when one extremity of the child's long diameter is brought artificially to the superior strait; and it is on cases of this kind, that the partisans of the cephalic version have endeavored to ground the preference they accord to it over the pelvic one. The respective advantages and disadvantages of the two versions will be better comprehended by a systematic consideration of the various circumstances, under which, some region of the trunk presenting, the cephalic version has been recommended.

The version by the head has been advised: 1st, before the labour; 2d, during the labour, and prior to the rupture of the membranes; 3d, during the labour, and after the membranes are ruptured.

It is often possible to detect a position of the trunk in the latter stages of pregnancy, by the shape of the belly, the longest diameter of which is then transverse; by the child's head, which is very clearly felt in one of the iliac fossæ, in women whose abdominal walls are but little distended, are thin and easily depressible (although in two cases, reported by Dugès and Velpeau, it was felt above the pubis); and by the impossibility of reaching the presenting part of the foetus with the finger introduced into the vagina; when, if the child be somewhat movable in the amniotic cavity, it is very possible to bring the head to the superior strait. For that purpose, after having corrected the uterine obliquity, if any is met with, it is advisable to press up the side of the uterus to which the infant's breech corresponds, with one hand, and to push back its head with the other, in the direction of the superior strait. For well-directed external manipulations have not unfrequently proved sufficient to convert the position of the trunk into one of the vertex. The most difficult point is to keep the head thus reduced, for the child often regains its primitive position after the reduction.

Where the travail has commenced, and the membranes are still intact—supposing that, by aid of the touch, or the signs above indicated, we have been enabled to recognize a trunk presentation, we may conjoin the introduction of a finger or two into the os uteri to the exterior manipulations just spoken of. For these fingers, by pressing the presenting part directly upwards, would materially aid the other hand in getting the head out of the iliac fossa; and then a rupture of the membranes, practiced immediately after the head's

reduction, would permit the uterus to retract, and keep the latter at the superior strait. I can see no objection to such attempts when properly made, more especially in the latter case, when tried at a stage of the travail where the os uteri is sufficiently dilated or dilatable, to admit of a resort to the pelvic version in case of failure.

Flamand did not restrict the rule to bring down the head in trunk positions to the cases just indicated; but he was also in favor of the performance of the cephalic version, even after the rupture of the membranes and the discharge of the amniotic liquid. He has even gone so far as to point out the particular manœuvre for each one of the distinct presentations admitted by him, for the child's anterior, posterior, and lateral planes (*Journ. Complement. des Sciences Médiçales*); but we deem it useless to enter into those long details, more especially since they may all be comprised in this: to grasp the presenting part, push it up above the strait, and then carry it as far as possible towards the side opposite to where the head is found; and afterwards get hold of this latter, and bring it down, if the efforts made by the other hand through the abdominal walls have not proved sufficient to make it descend into the excavation.

Flamand himself acknowledges that this operation seldom succeeds, excepting when some region of the neck or upper part of the thorax presents at the strait. As for ourselves, we believe it would be difficult, even under such circumstances; however, it is barely possible, especially if there is still some water in the uterus, and the contractions are not very energetic. But where a long time has elapsed after the rupture of the membranes and the total discharge of the amniotic liquid, and there is a strong retraction of this viscus, we do not hesitate to recommend the pelvic version in preference; and particularly so, in those cases where some region on the lower moiety of the trunk presents at the centre of the upper strait.

However, there is one case that would, in our opinion, justify a persevering attempt to effect the cephalic version; that is, where a presentation of the trunk coincides with some vice of conformation in the pelvis. Because here it would be better to expose the infant to the dangers of the operation of grasping the head, and bringing it to the superior strait by main force, and the woman to the irritation which might thence result, than by drawing down the pelvic extremity, to run the risk of the head's extension, by being arrested above the superior strait after the delivery of the trunk, and of all the disastrous consequences that might result therefrom.

When a trunk presentation is complicated by the descent of an arm, the cephalic version, recommended by Ruffius (*humeri repellendi ut cadat caput*), Rhodion, and others should, in my estimation, be wholly rejected; since the necessity of a previous return of the arm would then render the version by the head exceedingly difficult, if, indeed, as before stated, the premature rupture of the membranes did not constrain us to abandon it altogether. Consequently, the pelvic version would appear to be far preferable in cases of this kind.

We shall conclude our remarks on the cephalic version in trunk

presentations, by saying that whenever any accident, such as hemorrhage, convulsions, etc., shall complicate the mal-presentation, and, as a consequence, when it will be requisite to terminate the labour as soon as possible, the pelvic version should be resorted to in preference; and, in all such cases, we prefer this mode of operating, by means of which the patient can be much more promptly delivered, to that recommended by Flamand and his pupils. In fact, the cephalic version, followed by an application of the forceps, ought to be reserved for those cases where the deviated position is complicated with a vice of conformation in the pelvis, and the head is above the superior strait.

Lastly, as the cephalic version is usually resorted to, for the purpose of saving the child, the death or non-viability of the latter would appear to us a formal contra-indication against this operation.

Presentations of the Pelvic Extremity.—“Partisans, as we are, of the version by the head,” says Flamand, “we are not prepared to propose it in these cases indiscriminately, notwithstanding we are that way inclined. But after a consideration of the following suppositions, we do not doubt that every unprejudiced accoucheur will follow our advice and attempt this operation.

“Supposing that a monstrosity were to present without any lower extremities whatever, or one which only has a couple of little stumps near the buttock, that are too small to furnish a sufficient hold for the accoucheur’s hand to draw down the breech, and at the same time the mobility of the foetus indicates the possibility of bringing down the head, who would hesitate to attempt the operation?” As for ourselves, we should not hesitate to leave the accouchement entirely to the powers of nature; for what would be gained by drawing on the pelvic extremity? For have not the precepts of Madame Lachapelle, of Desormeaux, of Dubois, and others, taught us, that all tractions on this extremity are more hurtful than beneficial? And would not some of those disadvantages that Flamand and his followers refer to the delivery by the breech, and on which they rely for advising the cephalic version, would not they result in consequence of such imprudent tractions?

“Supposing a woman has but three inches and three lines in her sacro-pubic diameter, and that in former labours she has lost several children that were delivered by the breech; and besides, that the foetus appears sufficiently movable at the time of, or shortly after we are obliged to rupture the membranes—an attempt to effect the version by the head is warrantable.”

We likewise believe that, in such a case, the accoucheur would be justified in making this attempt before the membranes are ruptured; but after the discharge of the waters, it appears to us that this operation must be impracticable in a large majority of cases; and we should then prefer some well-conducted tractions on the trunk of the child, using every exertion to keep up the flexion of the head at the moment when the latter reaches the superior strait. The observations of Madame Lachapelle (*tome iii.*) afford a satisfactory reason for our preference, even in those cases where the pelvic retraction

results from the direct forward projection of the sacro-vertebral angle; and this precept would be still more applicable, if one of those pelvæ described by M. Nægèle, under the name of the oblique-oval were to be met with. For the tractions then made on the breech would have the effect of turning the child's back, and as a consequence the large occipital extremity of the head, towards the widest portion of the basin.

On the whole, therefore, we believe that the cephalic version may and ought to be attempted:—

1st. In irregular vertex presentations; when it is, properly speaking, nothing more than a simple correction of the head (page 545).

2d. In certain face positions, that were carefully pointed out on page 547.

3d. In presentations of the trunk, whether before the labour, or during the labour and before the rupture of the membranes; but, during the labour, and after the membranes are ruptured, it is only to be resorted to when there is a vice of conformation in the pelvis.

4th. In the breech presentations; but *only* prior to the rupture of the membranes, and when there exists a vice of conformation. . . . But even then it will generally be impossible.

From the foregoing it will be seen that, although we do not fully indorse the views of Flamand, yet we give to the cephalic version a much greater importance than has been accorded to it by most of the French accoucheurs. It is because we believe that to *let alone* as much as possible, is the true course in practice; and that, in those cases where nature seems to be incapable of effecting the delivery, the accoucheur ought simply to aid, and not supplant her powers; that he must conjoin but not substitute his efforts for hers, and he must permit her to enjoy all her rights, as soon as she can dispense with his intervention.

ARTICLE II.

OF THE PELVIC VERSION.

This is an operation, whereby the pelvic extremity is brought to the superior strait, from which it had been more or less removed. In describing it, it will be necessary to first study the general rules that are applicable to all cases of version by the breech; after which we can point out the peculiarities offered by the vertex, face, and trunk positions, respectively. But there are certain conditions necessary to the performance of every version, and we must primarily designate them.

§ 1. NECESSARY CONDITIONS.

In order to perform the pelvic version, it is requisite that the os uteri be dilated or dilatable; that the presenting part be not engaged too long in the excavation, and more particularly that it has

not cleared the neck of the uterus; and that no disproportion exist between the size of the head and the dimensions of the basin.

1. It is necessary, we say, that the os uteri be sufficiently dilated or dilatable to permit the ready introduction of the hand, and the free passage of the child's parts. The neck may be considered as being properly dilated, when its orifice offers nearly two inches in diameter; but it may be much less patulous, and yet the version be still possible, because it is then sufficiently dilatable. In the latter case, the cervix is thick, soft, supple, and easily distended; it is neither tense, nor contracted, and the finger, on being passed over the divers points of its circumference, finds that it does not resist in the least, and that it admits of being readily enlarged. This dilatability of the uterine orifice is particularly apt to be met with, when the presenting part cannot engage in the os uteri after the membranes are ruptured, on account of its volume or bad position; because, being no longer sustained, the margins then relapse towards its centre, and retract.

2. The second condition is, that the presenting part be not too deeply engaged in the excavation, and more especially that it has not cleared the cervix. It will presently be seen that, before endeavoring to enter the uterus, the accoucheur's hand ought to push the part, which is already more or less engaged in the excavation, above the superior strait. Now, it is evident that if this part had cleared the os uteri, it could not be returned without the womb being pressed back at the same time, and consequently without exposing its utero-vaginal attachments to laceration.

3. The pelvic version is only to be resorted to when no disproportion shall exist between the dimensions of the head and those of the pelvis. Hence, every foetal monstrosity, and every marked retraction of the basin, constitute a motive of exclusion. In fact, one of the most serious difficulties in its performance, is the extension and arrest of the head after the delivery of the trunk, by a retraction in the pelvis; and then the necessary tractions, and the trouble in the application of the forceps, will nearly always compromise the child's life. It is therefore advisable to prevent these dangers, by not performing the pelvic version in those cases where the smallest diameter of the pelvis is less than three and three-quarter inches (for this is the natural limit of the pelvic version), unless circumstances prevent us from acting in any other manner.

§ 2. GENERAL RULES OF THE OPERATION.

The operation, in the performance of the podalic version, is composed of three principal stages: namely, the introduction of the hand, the evolution of the child, and the extraction of this latter.

1. *Introduction of the Hand.*—The patient having been properly placed, the operator sits down or rests on one knee before her, and then presents his hand at the entrance of the vulva, and endeavors to introduce it by pressing gently from before backwards, and from above downwards. If the vulva is very large, the fingers are held together and introduced, flat at first, taking care to depress the

anterior-perineal commissure with the cubital border of the hand; but, if the vulva is very narrow, the fingers are introduced one after another, and then brought together in such a way as to form a kind of gutter, in which the thumb can slip along their palmar concavity, and thus enter imperceptibly. The hand thus forms a cone, the base of which is still at the exterior, while its apex endeavors to penetrate up into the vaginal cavity. The wrist is then slightly depressed, in order to accommodate the direction of the hand to the line of axis of the inferior strait; and, as the fingers penetrate deeper, it is depressed more and more, so as to make the hand describe a curve with its concavity anterior, corresponding to the pelvic axis. The introduction is facilitated by gently and moderately rotating the hand on its own axis, with a view of effacing the folds of the vagina.

Whenever possible, the introduction into the vulva must be made during the interval between the pains. Ant. Dubois gave a different precept, and taught that it was preferable to make the introduction while the pain lasted; for, said he, the woman, being engrossed with the uterine pain, will not perceive that caused by the entrance of the hand. But every one who has attended a female in labour, and has made the vaginal examination during the contraction, must be convinced of the error of this celebrated accoucheur.

The fingers, having reached the upper part of the vagina, may find the os uteri either freely dilated or sufficiently dilatable. In the former case they can be made to penetrate into the organ without any difficulty, by placing them between the internal uterine surface and the presenting part of the child; but, in the latter, they are to be introduced one after the other, in such a manner as to form a cone, the extremity of which is entered in the orifice. Then the hand is pushed along, by imparting to it some gentle rotatory movements, and by separating the fingers a little from each other, so as to make a moderate and uniform pressure on the various points of the neck's periphery. When the services of an assistant can be obtained, he should be directed to place both hands over the fundus of the uterus, in order to prevent this organ from being pressed up by the efforts made to introduce the hand; if there is no assistant, the other hand of the accoucheur is placed over the fundus to perform the same office.

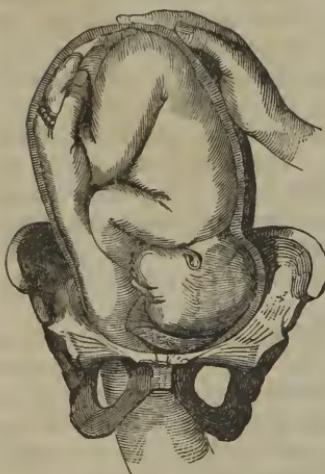
The os uteri ought to be entered during the interval of the pains. As soon as the hand has reached the cervix, it is necessary to ascertain that we have not been mistaken about the position; and, in case an error has been committed and the wrong hand has been introduced, it should be withdrawn at once, and replaced by the other, if there is reason to anticipate much difficulty in the version; that is to say, if the membranes have been ruptured a long time, the pains are strong, and the waters are wholly discharged; for we ought not to add to the difficulties that already exist by the choice of the wrong hand. But, under opposite circumstances, we might use the hand first introduced, so as to spare the patient the pain

and repugnance which the introduction of a second one always occasions her.

When the hand arrives at the os uteri, the membranes may either be still intact, or they may have been ruptured for a long time. Supposing the former to be the case, the question arises, are they to be ruptured before passing any further? It is far better to insinuate the hand between the external surface of the membranes and the internal one of the womb, and thus get it up to the point where, from the child's position, we know the feet ought to be found; and only rupture the membranes at the moment when the lower extremities are seized, or at least not until after the whole hand has penetrated into the uterine cavity. By thus leaving the membranes unbroken until the feet are grasped, we prevent a too rapid discharge of the amniotic liquid, for the forearm being placed in the orifice of the neck obliterates it completely; and we have the great advantage of reaching the fundus uteri much more easily, of turning the feet more promptly, and of practicing the second stage or evolution of the foetus more readily, the latter being yet movable in the surrounding waters. If the hand finds the placenta attached to one side of the organ, as it advances between the internal surface of the womb and the external one of the membranes, it is very necessary to avoid its detachment, which might be done by passing around its margin; and, where this is impracticable, to rupture the membranes at the inferior border of the placenta.*

The introduction of the hand is far more difficult where the membranes are broken, for the presence

Fig. 82.



In this figure, the head has been pushed up into the left iliac fossa, and one hand gets hold of the feet while the other supports the organ externally.

of another foreign body stimulates the contractions still more. It is then advisable to suspend all attempts, as much as possible, and only renew them when the pains are a little calmed. The first step in the process is to get hold of the presenting part, and push it up a little above the superior strait; then it is to be carried towards one of the iliac fossæ, where it is sustained, first by the palm of the hand, and afterwards by the front face of the forearm. The mode of reaching the feet varies according to the particular position. Some accoucheurs have laid it down as a general rule to pass the hand around the side of the child that is directed towards the mother's loins, and then slip it along its back and breech, and down along

* This plan is recommended by Peu, Smellie, Deleurye, Hamilton, Boér, Nægèle, and Madame Lachapelle. The latter has even been careful to suggest another precaution; namely, to rupture the membranes during the relaxation of the uterus, lest its contraction drive out a large portion of the waters.

the posterior face of the lower extremities to the feet. For, by following an opposite course, and laying it flat on the fœtus' anterior surface, and thus guiding it directly to the feet, nothing would be easier than to mistake the hand for a foot, or an elbow for the knee, in the folded up condition in which the superior and inferior extremities are then found. There are some cases in which this direction may be followed, but in many others it is useless or impossible to take this precaution: useless, when a considerable quantity of water still remains in the cavity of the uterus; and impossible, where the membranes have been ruptured for a long time, and the uterine walls are forcibly retracted on the child's trunk; for then we must be content with slipping the hand flat along the anterior plane of the fœtus, being careful not to confound a foot with a hand.

2. *Evolution of the Fœtus.*—Having succeeded in finding the feet, the hand grasps them in such a way, that the index finger is placed between the two internal malleoli, the thumb on the external surface of one leg, and the three fingers on the external face of the other; or rather, such is the direction given by many medical authors; but in practice, as in everything else, we cannot always do what we would, and it is only necessary to be certain that we have a firm hold of them. (*Vide Fig. 83.*) It is sometimes difficult to

seize both feet at the same time; and we must then be satisfied with a single one, provided the search after the second is attended with considerable difficulty. The feet are then drawn upon in such a way as to double up the fœtus on its anterior plane. During the performance of this evolution, which is always to be done during the interval between the pains, the other hand should be placed over the part of the abdomen where the head is found, and by pressing up the latter, it should endeavor to make it mount up towards the fundus of the womb. It sometimes happens, as just stated, that only one foot can be brought down into the vagina, and if this is the anterior or sub-pubic one, the operation might be terminated without going in search of the other; but if, on the contrary, it is the posterior foot, we should, after having secured it with a fillet,*

Fig. 83.



The same position in which the version is commenced by drawing down the feet.

* The fillet usually consists of a piece of tape, one or two finger's breadth wide and a yard long, made into a loose slip-knot, which is applied above the ankle; when the foot is still in the vagina, the knot is placed on the dorsal surface of the hand, and then, by grasping the foot, it is slipped over it above the malleoli, and afterwards tightened by drawing on the two extremities of the tape that hang down at the vulva.

introduce the hand anew, and follow the internal border of the limb already extracted, up to the root of the opposite leg; whence, by tracing out the latter, we finally get to the other foot, which is to be brought down in a line of adduction.

3. The *extraction* is the only stage of the version performed during the uterine contraction. In fact, as this latter facilitates the tractions made on the pelvic extremity, and likewise serves to keep the head flexed on the chest, the accoucheur would only be justified in terminating the labour, without waiting the return of the pain, when there was a complete inertia of the womb conjoined with some accident that would require a prompt delivery.

At first, we must draw on the sub-pubic limb as much as possible, because we thereby encourage the rotation of the child's front plane towards the mother's loins, and we are better enabled to press the parts backwards; that is, to get them in the direction of the axis of the superior strait, which they have to traverse.

As the lower extremities are delivered, the whole extent of the disengaged parts are grasped by the two hands, taking care to place the thumbs on the posterior part of the limbs, the index and medius on their external surface, and the ring and the little fingers on their anterior face. When the breech appears at the vulva, it is necessary to ascertain the state of the cord; for that purpose, a finger is

Fig. 84.



The version is here completed, and the occiput, which was placed in the left iliac fossa, at the commencement of the operation, will now come down behind the right acetabulum.

Fig. 85.



Management of the cord.

to be slipped up to its umbilical insertion, when, if it be found tense, the thumb is joined to the finger, and by making a gentle

traction on its placental extremity, by both, the loop it forms will be enlarged. If the cord has slipped over one leg, and got into the fissure between the thighs, it will likewise be necessary, after having drawn slightly on it, to disengage the child's posterior limb, and place the cord in contact with the perineum.

In those cases where the version has been demanded by an unfavorable position, and the child has been restored to a natural one by the pelvic evolution, the rest of the travail is left to nature; provided always the force and frequency of the pains are such as to give us reason to anticipate a speedy delivery. But if the uterine contractions are feeble or slow, or if the severity of the symptoms endangers the life of either the mother or the child, the tractions must be kept up, and the patient be encouraged to aid them by all her remaining strength. The hips, loins, and lower part of the chest soon come down; and, as this delivery progresses, the accoucheur's hands ought to embrace as many parts as possible, constantly seizing those that are nearest to the vulva, and taking care always to act on the bones, not on the soft parts. The arms are apt to become stretched out along the sides of the head, and thus descend with it into the excavation; when their disengagement must be effected in the following manner: we commence with the posterior one, which only has the resistance of the soft parts of the perineum to overcome, and therefore will offer less difficulty than the sub-pubic arm. The same hand is again used by placing its index and middle fingers on the posterior and external side of the arm, just beyond the humero-cubital articulation, while the thumb rests on the anterior internal plane of the humerus, where it acts like a splint; the axillary space is thus found lying in the interval that separates the thumb from the two fingers. The trunk having been enveloped in a napkin is next carried up in front of the pubic symphysis, either by the other hand, or by an assistant. Then the fore and middle fingers, acting over the whole extent of the arm and a part of the forearm, bend the latter down over the side of the head and face towards the chest, on the side of which it is ultimately placed after its complete disengagement. The sub-pubic arm is next delivered by supporting the child's trunk upon the other forearm, and depressing it towards the anus, while the hand (not engaged in the previous operation) is introduced in a state of forced pronation; that is, turned over on its radial border in such a way that the thumb can be still applied on the internal, and the index and middle fingers on the posterior face of the arm; and then this is brought down over the side of the head, face, and front of the chest just like the posterior arm.

Fig. 86.



The delivery of the posterior arm.

In ordinary cases, the head descends flexed into the excavation, the occiput being turned towards some point adjacent to the symphysis pubis, and the disengagement is effected spontaneously if the pains are tolerably strong and frequent; and if necessary to facilitate it, we have only to carry the trunk up in front of the symphysis. But should it happen that the expulsion of the head is somewhat delayed, we must aid it by introducing two fingers on the sides of the nose, and two others on the occiput, and then, by means of the latter, the operator pushes up the occiput, while he draws down, on the contrary, with those implanted on each side of the nose, and thus determines a movement of flexion which secures the delivery of the head. The difficulty would be much greater if the face was turned forward, and the occiput backward; though even here, if the head is not very voluminous, and the pelvis is large, we might effect its delivery by depressing the trunk on the perineum, and by drawing down the face in the pubic arch, with the fingers planted on the sides of the nose, so as to flex the head; or, on the other hand, by carrying the trunk up in front of the pubis, we might succeed in delivering the occiput first at the anterior perineal commissure.

§ 3. OF THE DIFFICULTIES THAT MAY BE MET WITH IN PERFORMING THE PELVIC VERSION.

In common simple cases, the manœuvre is accomplished in the way we have just described; but it very frequently happens that the operator encounters some difficulties in its performance, dependent either on the mother or on the child, which next claim our attention. Those which the mother's organs may present, are an excessive narrowness of the vulva, an obstinate resistance at the uterine orifice, the spasmodic retraction, and the mobility of the body of the womb, and the insertion of the placenta over the os uteri. Those appertaining to the foetus, are a shortness of the umbilical cord, the unusual volume of the shoulders, the crossing of the arms behind the neck, and the extension of the head.

A. *Narrowness of the Vulva*.—Unless the narrowness of the vulva results from the persistence of old adhesions (vide page 479), it is seldom considerable enough, even in first pregnancies, to constitute a serious obstacle to an introduction of the hand. The only precaution to be taken is to pass in the fingers one after the other, and to make the hand enter gently and carefully.

B. *Resistance of the Uterine Orifice*.—The causes and principal indications of the resistances which the uterine orifice may offer to the spontaneous expulsion of the child, have already been studied (page 505, et seq.); and it is possible that these same difficulties may be met with in the performance of the version. Here, also, the retraction may be seated at the external or the internal orifice of the neck. Two conditions may be met with when the external is the only one affected; that is, the pelvic evolution may be indicated, either by a trunk presentation or else by some accident which, by compromising the life of the mother or child, renders a prompt termination of the travail imperative. In the former case,

whatever be the cause of the retraction, or of the non-dilatation of the orifice, all the means calculated to facilitate this dilatation will be brought into use; such as venesection, if the patient is plethoric, tepid bathing, fumigations, and unctions with the extract of belladonna on the periphery of the cervix; and, where these remedies have been employed without success, we should act as in the following case. In the latter case, the necessity of terminating the labour promptly does not permit us to rely on the employment of the means just enumerated, because their action is not developed for some time; and our only resources are in a forced introduction of the hand or a division of the neck. We have hitherto stated that, as a general rule, the repeated incisions on the cervix appear decidedly preferable to a forcible introduction of the hand, which latter is always a slow, difficult, and very painful operation, whilst the instrument is not even felt by the patient; besides, it is not dangerous, and its results can be more certainly relied on. When the spasmodic contraction is confined exclusively to that portion of the uterine walls which constitutes the internal orifice in the non-gravid state, the hand, after having penetrated the external one without difficulty, is suddenly arrested by an obstacle that it cannot surmount. This retraction is apt to take place, in the presentations of the cephalic extremity, around the child's neck after the head is free, but it is also occasionally observed in the trunk presentations. The measures that we shall presently point out for combating the spasmodic contraction of the body of the womb, are equally applicable in cases of this kind.

c. *Insertion of the Placenta over the Os Uteri.*—As well known, this circumstance is an habitual cause of hemorrhage, and often requires the pelvic version. When the placenta is only attached by one margin to some point of the uterine neck, the hand is introduced at the part which is not covered, and the version presents nothing peculiar. But a different course has been advised relatively to the introduction of the hand, where the insertion takes place centre for centre, and no portion of the placenta's circumference is detached. Thus it has been recommended to perforate the centre of the after-birth, and introduce the hand through this opening; but this appears to us a difficult and dangerous process, because: 1st, a great number of umbilical ramifications are then necessarily torn, and a hemorrhage produced which may speedily prove fatal to the child; 2d. The force necessary to effect this perforation is sometimes sufficient to drag upon, and then detach, the periphery of the still adherent placenta; and, 3d, the central opening made in the after-birth will seldom be spacious enough to permit the child's trunk and head to pass freely; whence it may happen that the frictions made by the movable parts of the fetus against the margins of this opening, will facilitate a displacement of the arms and an extension of the head. Consequently, unless the patient's strength be already exhausted by the flooding, or the placental adhesions be very strong, we would rather detach some point of the placenta's circumference, and thus get the hand between its external face and the internal

wall of the uterus. True, by operating in this manner, we should lacerate a certain number of utero-placental vessels, and thereby add to the sources of hemorrhage, but we would succeed in saving the child's blood; besides which, the hand and forearm, at first, and then a little later the trunk of the foetus, by becoming applied over the mouths of these vessels, would compress them like a tampon, and thus put an end to the hemorrhage.

D. *Violent Retraction in the Body of the Womb.*—This is a condition that always makes the version very painful and very difficult, and, in certain cases, may even render it impossible; which, of itself, is a sufficient reason for preferring an application of the forceps to it, when the cephalic extremity presents. But, in a case of trunk presentation, the version would be the only practicable measure; and even that might be rendered wholly impossible by the retraction of the uterus. Here, likewise, venesection and tepid bathing prove very useful; and the employment of the opiates is particularly indicated, for the aqueous extract of opium, when administered in injections, or by the stomach, in the dose of three-quarters of a grain to two grains, or an equivalent quantity of laudanum, is most generally found sufficient to overcome the resistance in the body of the womb. Under such circumstances, Dewees highly extols a resort to general bleeding, carried to syncope; and he makes the patient stand up during the operation, whenever possible, so as to produce this effect more speedily.

I had an opportunity of putting the advice of the American accoucheur into practice, for the first time, on a lady in la rue du Four-Saint-Germain, to whom I was called in consultation by Dr. Trèves. The child presented by the left shoulder; notwithstanding which, the ergot had been administered, in consequence of an error of diagnosis, and the uterus was so retracted on the trunk of the infant, that an introduction of the hand was altogether impossible. I made the patient get up, and had her sustained by two assistants; the vein was opened, and I permitted the blood to run until the woman fainted; when she was immediately replaced on her bed, and the version was effected without difficulty.

If these measures fail, and the child be still living, there is evidently no other resource than to wait and hope for a spontaneous evolution from the expulsive efforts of the uterus. If it be dead, the section of its neck, according to the plan of Celsus, and a separate extraction of the trunk, and afterwards of the head, ought to be immediately practiced, with a view of sparing the patient the disastrous consequences of a prolonged and most often a uselessly prolonged travail. (*Vide Embryotomy.*)

Again, the retraction of the uterus very frequently renders the efforts made during the version to turn the anterior plane of the foetus backwards ineffectual; and where this is the ease, it is not advisable to operate on the trunk, by pushing it back and drawing it down alternately, endeavoring to impress a slight rotation on it each time, as certain accoucheurs have recommended; for that would very often be impossible, and, besides, by being carried too far, it

would expose the child's neck to torsion; for the head, being held by the contraction of the fundus uteri, might not participate in the rotation impressed on the trunk. It is much better, therefore, to renounce it altogether and permit the face to come above.

E. *Mobility of the Body of the Uterus.*—According to M. P. Dubois, a sufficient stress has not been laid upon this difficulty; because, if unattended to, it may absolutely prevent the introduction of the hand as far as the fundus uteri. That is, the hand, being wedged in between the uterine and foetal surfaces, attempts in vain to get at the feet, since the womb, the hand, and the trunk of the child then form a whole which turns on itself, but the hand does not progress into the interior of the uterine cavity. To remedy this obstacle, it is only necessary to have the fundus of the organ kept steady, by directing an assistant to place both hands over its superior and lateral parts.

F. *Brevity of the Cord.*—Whatever be the cause of its brevity, the cord when very short may become stretched, during the delivery of the pelvic extremity, and this be carried to such an extent as to occasion its rupture. This accident is to be prevented by cutting the cord, when the tractions made on its placental portion are not sufficient to relax it.

G. *Volume of the Shoulders.*—As the loins become free at the vulva, the shoulders engage at the superior strait; when it happens, in certain cases, that the tractions, which up to that time had been efficacious, cease to be so any longer, and some resistance is experienced in completing the delivery. This resistance is dependent solely on the fact that the bis-acromial diameter of the shoulders corresponds to the diameter of the superior strait; and consequently, from its width, encounters some difficulty in clearing the latter. But this is easily relieved by imparting some oblique movements to the portions of the child already disengaged, which carry the breech successively towards the groin of one side, and the sacro-sciatic ligament of the opposite side; whereby the bis-acromial diameter is inclined, and its two extremities are made to engage in the excavation one after the other.

H. *Crossing of the Arms behind the Neck.*—It sometimes happens that one of the arms (ordinarily, the sub-pubic one) is found crossed behind the neck, at the time of the delivery. We have advised that an attempt be made to bring the child's posterior plane around in front; but, in order to accomplish this, it is necessary to make the trunk undergo a considerable evolution, during which the arms, that are not involved in the movement, might be displaced by rubbing against the matrix, and thus become crossed between the neck and the posterior face of the symphysis pubis. It is highly important to bear in mind that, according to the observation of Dugès, this crossing of the arms may take place in two ways; namely, they may be crossed behind the neck, after having been first raised up on the sides of the head, and then the overlapping is effected from above downwards and from before backwards, relatively to the foetus; or it may occur from below upwards, the arms then mount-

ing up along the child's posterior plane, and becoming placed under the occiput. This latter circumstance may be produced in the following way; as the arms are usually located on the sides of the thorax, they may not participate in the movement of rotation impressed on the trunk, in making an attempt to bring the anterior plane of the foetus towards the mother's loins; and consequently one or both of them may thenceforth be found placed on the child's dorsal plane. Then, supposing the tractions on the breech are continued, the arm will become arrested against the symphysis pubis, while the trunk descends or is extracted, in such a way as to be still there when the neck reaches that point. But these two cases can be distinguished from each other by remarking that, when the reversion of the arms has taken place from above downwards, and from before backwards, the inferior angle of the scapula is necessarily removed to a considerable distance from the median line of the spine; while, on the contrary, it will be quite close to it when the crossing has occurred from below upwards along the back of the foetus. The diagnosis is important, since the disengagement of the crossed arms evidently cannot be effected in the same manner in both cases; and because, as a general rule, the arm has to be brought down in an opposite direction to the course it followed in becoming displaced. Thus, in the latter case, it must be made to descend along the back, by hooking the elbow with one or two fingers; in the former, it will be first brought over the occiput, and then down along the side of the head, face, and sternum. This disengagement is sometimes exceedingly difficult, for the occiput, being strongly pressed against the symphysis, seldom leaves free space enough between it and the os pubis for the operation. When this occurs, it has been recommended to press up the chest forcibly, with a view of making the occiput go upwards, and thereby releasing the arm. It would perhaps be better, after having disengaged the posterior arm, to impress a movement of rotation on the whole trunk and head of the foetus, on its longitudinal axis, which would carry the occiput and the anterior arm into the hollow of the sacrum.

1. *Arrest of the Head.*—Both the retractions of the pelvis and the extension of the head may retard the delivery of the cephalic extremity. But as we have already pointed out what is proper to be done in the former case, we need not revert thereto again.

When the expulsion of the foetus is left to the powers of nature, the head descends, moderately flexed, into the excavation, and most generally its disengagement presents no marked difficulty. But when it becomes extended in consequence of some improper tractions on the breech, its long diameters are brought into correspondence with the diameters of the pelvis, and its further delivery is thereby rendered impossible. Of course, in this state of extension, the occiput may either be found in front (though this seldom happens), or it may be found behind, the face being above.*

* The extension of the head, during the version, is far more common in those cases where the occiput is turned towards the sacrum. The reason of which will

Where the occiput is in front, the flexion of the head is effected without trouble ; for it is generally sufficient to place two fingers on the sides of the nose, or else on the lower jaw inside of the mouth, and then depress the chin by a moderate traction on this part ; whilst two fingers of the other hand are passed in under the symphysis and implanted on the occiput, so as to press up the latter above the superior strait (*vide Fig. 87*). When this manœuvre does not prove successful, it has been recommended, before having recourse to the forceps, to introduce the hand into the hollow of the sacrum and grasp the face with its palmar concavity, in order to bring down the head into its normal position by effecting a forced flexion.

Fig. 87.



The mode of flexing the head, by drawing down the chin and pushing up the occiput.

Fig. 88.



Mode of rotating the face into the hollow of the sacrum.

When the occiput is found behind, and its delivery is not possible, either by flexion or extension (*vide page 650*), it is advisable, says Madame Lachapelle, to change the position of the head and carry the face back into the hollow of the sacrum ; and, for that purpose, to introduce that hand into the sacral concavity whose palm would embrace the occiput most easily (the right, when the face is a little to the right, at the same time that it is in front ; the left, when it is

be readily understood by giving attention to the following circumstances : namely, the tractions are naturally made downwards and forwards, while the os uteri, which has a constant tendency to retract, is directed somewhat downwards and backwards ; whence it results that the anterior lip of the womb presses strongly on that portion of the child which is turned towards the pubis. Consequently, when the occiput is in front, the resistance offered by this lip has a tendency to flex the head still more ; but, on the contrary, when it is behind, the chin is almost inevitably caught by the anterior lip, and the head is thereby extended.

somewhat to the left; though, if the face were entirely above the pubic symphysis, the choice of the hand would be a matter of indifference); then the fingers, after having passed behind the head, are slipped over one side of it, and pushed forward as far as the mouth, by gliding along the nearest cheek (*vide Fig. 88.*) The hand is then forcibly inclined on its cubital border, having the palmar surface in front; next, it draws the parts on which the extremity of the fingers is applied, that is to say, the face downwards and backwards towards the coccyx, when nothing further remains than to flex the head and extract it as in ordinary cases.

§ 4. OF THE VERSION IN THE VERTEX, THE FACE, THE BREECH, AND THE TRUNK PRESENTATIONS.

After the minute detail into which we have just entered in describing the general precepts that are applicable to all cases of version, it will only be necessary to point out the peculiarities attending this operation in each of the ten positions admitted by us.

Presentations of the Vertex.—Whenever the vertex presents, the child will be placed in such a way that its occiput is directed either towards one of the points on the right lateral moiety, or towards one on the left lateral moiety of the basin; that is, either in the left or the right occipito-iliac position.

1. *Left Occipito-Iliac Position.*—In conformity with the precepts above given, we would here introduce the left hand; which, after having reached the os uteri, is to grasp the head in such a manner that the palmar face of the four fingers shall be applied on its posterior (left) side, and the thumb on its anterior one, the sinciput being lodged in the palmar concavity. Then, during the interval between the pains, the head must be pressed up towards the left iliac fossa; after which, the thumb is brought along side of the index, and the hand is passed successively along the left side of the head and neck, and behind the shoulder and elbow; in a word, it is made to traverse the whole left lateral plane of the foetus down to the breech; or, if this were attended with much difficulty, it would be better to slip it along the child's anterior plane, so as to go directly to the feet. (*Vide Fig. 82.*) While this movement is being effected, it is advisable to keep the head in the iliac fossa where it was originally placed, by constantly pushing it up, first with the thenar eminence of the hand, and afterwards with the front surface of the forearm. Having gained the nates, the hand, which up to that time had been kept in a state bordering on supination, is changed into one of pronation, in order to pass around the breech; when it descends on the posterior aspect of the lower extremities, extends the legs and reaches the feet, which it seizes as firmly as possible. Or, as stated above, we might guide the hand along the anterior plane of the foetus, and thus get directly at the feet.

In drawing down the feet, we must be careful to curve the child's trunk in the line of its natural flexure; whilst the other hand, placed over the left iliac fossa, pushes the head towards the fundus uteri, and thus facilitates the evolution of the foetus. This evolution being

once effected, the left occipito-iliac position is found to be converted into a right lumbo-iliac one. The subsequent progress of the delivery offers no special indication.

2. *Right Occipito-Iliac Position.*—In this case, the right hand would be chosen in preference, by which the head is to be grasped, as in the preceding case, and then to be pushed up towards the right iliae fossa; the hand traverses the right lateral or posterior plane of the foetus, and, after having seized the feet, converts the second position of the vertex into a first of the breech, or, in other words, into a left lumbo-iliac one.

Presentations of the Face.—In the face presentations, we use the left hand in the right mento-iliac, and the right one in the left mento-iliac positions. The four fingers are to be applied on the posterior cheek, the thumb on the anterior one, and the face will be lodged in the palmar concavity; the head, after having been pushed above the superior strait, will be carried towards the left iliac fossa in the right mento-iliac, and towards the right iliae fossa in the left mento-iliac positions; and then the evolution will convert the former of these positions into a right lumbo-iliac, and the latter into a left lumbo-iliac position.

Presentations of the Pelvic Extremity.—When the pelvic extremity presents, and any circumstance whatever demands a prompt termination of the labour, it is not, properly speaking, a version that the accoucheur has to practice, but rather a few simple tractions on the presenting part.

If the feet or the knees offer at the uterine orifice, or protrude into the vagina, the accoucheur merely seizes and draws on them, conforming to the rules above given: but where the lower extremities are stretched out along the child's anterior plane, and the breech alone presents, the course to be pursued varies a little, according as this part is more or less engaged in the excavation. Thus, when the nates are still above the superior strait, or at least are so little engaged that it is easy to press them up, we must act in the following manner, taking care to introduce the left hand in the left lumbo-iliac positions, and the right hand in the opposite ones: the buttocks are first seized by the whole hand, and gently pushed up into that iliac fossa towards which the child's back is turned; then the feet are sought out, by following the posterior aspect of the lower extremities, and they are brought down so as to draw upon them and terminate the third stage of the version. When the nates have reached the pelvic floor, the index finger of one hand is placed in the posterior groin, and the same finger of the other hand in the anterior one, and then, having both fingers curved like a hook, we draw on the buttocks until the feet are entirely clear. Lastly, if the breech is so far engaged as to be no longer capable of being pressed above the superior strait, and, nevertheless, has not yet descended low enough to be caught by the fingers, a blunt hook is employed, which is to be applied from without inwards on the anterior groin, if it is possible to make it slip up between the anterior hip and the symphysis pubis (*vide* Fig. 89); in the contrary case,

it is passed between the two thighs, and made to penetrate from within outwards on the internal part of the limb; but, in this latter case, it is necessary to protect the genital parts, the scrotum in particular, by one or more fingers previously introduced, lest they become embraced by the concavity of the instrument.

Fig. 80.



The mode of using the blunt hook in the breech positions.

pelvic version in these cases in order to remedy the defective presentation; and consequently that, as soon as he shall have converted this latter into one of the breech, he should abandon the rest of the labour to the expulsive efforts of the uterus, unless some accident, that is serious enough to threaten the life of either the mother or the child, may require a more prompt delivery. As before stated, the trunk presentations are two in number, and each side of the foetus may offer at the superior strait in two different positions: in the first of each, the head is in the left iliac fossa, and in the second it is in the right iliac fossa.

The rule hitherto followed in the choice of the hand is not applicable to the trunk presentations: for here we would introduce the right hand in the positions of the right lateral plane, and the left in the positions of the left lateral plane; after which the operation is conducted in the following manner:—

A. *First Position of the Right Shoulder (left cephalo-iliac).*—The right hand is to be introduced into the parts in a state of supination, when, after having endeavored to push the shoulder up above the superior strait, and a little towards the left iliac fossa, it is directed towards the right sacro-iliac symphysis, above which the child's feet are found; and the latter will then be seized and brought down into the vagina. In doing this, it is not necessary to bend the foetus in the line of its natural flexure, as in the vertex and face positions,

Presentations of the Trunk.—We have frequently repeated that the trunk presentations, of themselves, require the intervention of art; and that it is requisite to change the position of the child as soon as the conditions necessary to this evolution are met with. In the preceding article, we endeavored to point out those conditions under which we think an attempt to effect the cephalic version ought to be recommended; notwithstanding which the pelvic version is very often practiced, either because such attempts have proved ineffectual or because it is deemed advisable not to resort to them.

Nevertheless, before laying down the rules of the operation, we must remark that the accoucheur only resorts to the

but we may draw immediately on the feet and pull them into the excavation; for this lateral evolution, or bending on the side, is much more speedily accomplished, and it is not attended with any inconvenience. The feet, being once in the vagina, the operation is terminated as in all other cases.

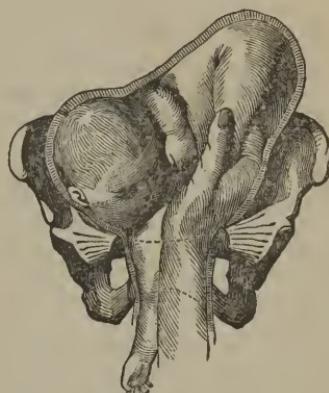
b. Second Position of the Right Shoulder (right cephalo-iliac).—Here, likewise, the right hand is introduced in a state of supination. The shoulder is seized and pushed up towards the right iliac fossa, and then the hand traverses the posterior plane of the fœtus, by

Fig. 90.



The introduction of the hand in the second position of the right shoulder.

Fig. 91.



Mode of seizing the feet in the same position.

passing backwards and to the left; when it reaches the nates, it gets around them by being changed into a state of pronation, and it then comes forward and to the left to grasp the feet, which are next brought down into the vagina. (Fig. 91.)

c. First Position of the Left Shoulder (left cephalo-iliac).—The left hand is introduced in a state of supination, and then, after pressing the shoulder upwards and a little to the left, it is directed along the child's back towards the right-posterior part of the pelvis, where it is passed around the breech by turning to a state of pronation, and it is next brought forward and to the right, so as to seize the feet.

d. Second Position of the Left Shoulder (right cephalo-iliac).—The left hand, introduced in a state of supination, pushes the shoulder above the superior strait and somewhat to

Fig. 92.



Mode of seizing the feet in the second position of the left shoulder.

the right; and then, passing towards the left side and posterior part of the uterus, it goes in search of the feet, which are there found placed.*

Trunk Presentations with a Descent of the Arm. (Presentations of the arm or hand, of authors.)—We have heretofore stated that the descent of the hand, in the shoulder presentations, is nothing more than an attendant circumstance of these latter. Consequently, whether the hand has been carried along by the gush of waters which escaped when the membranes were ruptured, or whether it has been drawn down by the accoucheur himself, in order to make out the diagnosis, it constitutes an obstacle of minor importance, and even one which may render the pelvic version more easy; and hence, so far from attempting to push back the arm into the uterus, we ought to apply a fillet on the wrist, not for the purpose of drawing upon the latter, but so as to prevent it from returning whilst searching after the feet in the ordinary way.

* As the reader will see, this operation is very simple; though it must be acknowledged, however, that, in those cases where the dorsal plane of the fetus is directed forwards, it renders this plane liable to be turned backwards after the child's evolution. Consequently, when we cannot succeed in turning the belly posteriorly during the traction, it gives rise to all the inconveniences hitherto pointed out, as occurring in those instances in which the face looks towards the pubis.

In order to remedy these difficulties and their attendant dangers, M. Velpeau recommends that the positions in which the back is in front (the first of the right shoulder, and the second of the left) be converted into dorso-posterior positions before attempting the evolution. Thus, he would endeavor to convert a second position of the left shoulder into a first of the left, by making the head pass above the pubis, or above the promontory of the sacrum, according to whether it was originally placed nearer to the anterior arch of the pelvis, or to the right sacro-iliac symphysis; he would then terminate it, as if it had primitively been a first position of the left shoulder. "Should the membranes have been long ruptured," adds M. Velpeau, "the womb strongly contracted, and the child not to be moved but with very great difficulty, there is a third manœuvre that ought then to be preferred, and which, perhaps, it would be well to employ in other cases; it consists in pushing the shoulder up with the right hand from behind forwards, as if to make the spine turn upon its own axis; then trying to reach the right side by passing along the front of the chest, while the womb is forcibly pushed backwards with the left hand; lastly, in taking hold of the feet, the right one first, so as to bring them down in the first position."—*Meigs' Translation*, p. 447.

We have only alluded to this manœuvre, because the author's name might give it some importance in the eyes of young practitioners. But in our estimation it ought to be rejected altogether. In fact, one of two things must then happen; for either the uterus is forcibly retracted (when this conversion, if persisted in, appears to us impracticable and dangerous) or else the womb is inert, and it would therefore be useless. As we have already stated (page 652), the reason for dreading a persistence of the child's anterior plane in front, is not because it cannot be turned backwards during the traction, but because there is reason to fear lest the head, by being arrested by the contraction at the fundus of the uterus, may not follow the movement of rotation impressed on the thorax, whereby a torsion of the neck might result. Again, if the organ is inert enough to admit of the preliminary conversion advised by Velpeau, it would doubtless be sufficiently so to enable the accoucheur to direct his tractions in such a way as to bring the occiput in front, and the face into the hollow of the sacrum, without hazard.

"Our object in applying this fillet," says Madame Lachapelle, "is to keep the hand at the exterior, lest the arm should take a wrong direction; as also lest, being stretched out as it is, it will not follow the rotation that turns the sternum of the foetus posteriorly, when, by being arrested by the pubis, and by ascending along the child's back, it might become crossed behind the neck." Finally, let us add, that the hand, or rather the arm, materially aids in accomplishing the rotation of the trunk, since it offers an additional hold for the tractions made on the body, and it obviates the necessity of delivering one shoulder, which is very often painful.

After what has just been said, the reader will doubtless be astonished in looking over the older writers, to observe the alarm occasioned by the so-called presentation of the *hand* or *arm*, and he will be still more surprised at the barbarous procedures employed by them for its management. They were evidently mistaken with regard to the cause of the difficulties that are often met with in the performance of the version under such circumstances. However, it must be acknowledged that, although a *presentation of the hand* is nothing more than a variety of the shoulder presentation, yet the descent of the forearm, and more especially of the arm beyond the vulva, constitutes an exceedingly unfavorable complication. Because, where this hangs down at the exterior, or nearly so, it must necessarily happen that the presenting shoulder is already forcibly engaged in the excavation; an engagement that can only take place when the whole of the waters have been discharged for some time, when the uterine contractions have been exerted for a long while on the child's trunk, and when the walls of the womb have become firmly retracted on the surface of the foetus. Moreover, the prolonged contact of the foetal inequalities is then very apt to bring on the spasmodic or tetanic contractions of the body and the neck of the uterus, which are justly considered as constituting one of the most serious complications; for they equally prevent the return of the presenting part, the introduction of the hand, and the evolution of the foetus.

Consequently, we are not to operate on the part that may present in these difficult cases; for a return of the arm into the uterine cavity is then impossible, and of little service; to draw on it strongly, under a hope of engaging the doubled up trunk in the excavation, and of making it perform a kind of artificial evolution, is to commence a manoeuvre that cannot be carried through, and which must greatly augment the existing difficulties; to go in search of the other arm, so as to subsequently pull upon it with a view of making the descended shoulder return, presupposes an introduction of the hand, which would be almost as difficult as searching after the feet; and, lastly, to scarify the arm or amputate it, is a barbarous measure when the child is living, and most generally useless when it is dead.

We repeat, it is not there that the genuine obstacles to the delivery are to be found; but it is rather against the violent contraction of the body and occasionally of the neck of the womb, that we are to act, by employing the measures recommended above.

Should these fail, the course to be pursued will necessarily vary, according to whether the foetus be living or dead. If still living, and the mother's condition does not absolutely demand a prompt delivery, we should hope, and wait for a spontaneous evolution. (*Vide Natural Labour.*) But, if her life is seriously compromised, though the child be yet alive, its viability may be considered as destroyed, and embryotomy be resorted to. (*Vide Embryotomy.*) The reasons for this course will be still more urgent when there is a certainty of its death.

CHAPTER II.

OF THE FORCEPS.

THE forceps is a kind of pincers composed of two blades, that are very similar to each other, and which are specially intended to be applied on the head of the foetus.

The honor of inventing this instrument has been attributed to several persons; but, at the present day, it is clearly established that the forceps was invented by a member of the family of the Chamberlens, who, during the first half of the seventeenth century, pursued the censurable course of holding it as a secret, by the aid of which they promised to terminate the most difficult labours. It would appear, however, that it soon became known to some of the English practitioners; for Drinkwater, who practiced the art of midwifery from 1668 to 1728, made use of instruments which, if we may judge from the description given of them by Johnson, closely resembled those employed by the Chamberlens.

In 1670, one of the Chamberlens came to Paris for the purpose of selling his secret; since, according to the account of Mauriceau, he had proposed to the king's chief physician to make known his instrument for a remuneration of ten thousand crowns. As Chamberlen believed his process was applicable to all cases, he unfortunately promised to effect the delivery in a woman whose pelvis was deformed to an extreme degree, and on whom Mauriceau had deemed the Cæsarean operation to be necessary. Consequently, as the French accoucheur had foreseen, all the attempts of Chamberlen to accomplish the delivery proved ineffectual, and he returned to England, abandoning all the glittering hopes of fortune that he had expected to realize on arriving at Paris. It would seem that he afterwards made a journey to Holland, about the year 1693, and communicated, or rather sold, some of his instruments to certain accoucheurs there, among whom Roonhuysen, Ruysch, and Bockelman are particularly mentioned. In fact, it is almost certain that the famous lever of the former of these physicians had no other origin, and was only a slight and defective modification of the in-

strument he obtained from Chamberlen. However this may be, the forceps was likewise held as a secret for a long time in Holland, for it was not until sixty years afterwards, that is, about the year 1753, that Visscher and Van de Poll brought Roonhuysen's lever into general notice.*

Palfyn, an accoucheur of Gand, has also been incorrectly considered as the real inventor of the forceps. He made several trips to London and Germany, with a view of finding out this wonderful secret; which, according to Mauriceau, had furnished Chamberlen an income of more than thirty thousand livres per annum (an enormous sum for that period); and it is probable that it was in consequence of the information obtained in these two countries, that he designed the draw-head (*tire-tête*), subsequently presented by him to the Academy of Sciences at Paris.†

Chamberlen's forceps underwent a number of modifications, after it became public property, that were generally unimportant; and fortunate indeed was it when the so-called improvements did not render it more incommodious and more dangerous than before. But the middle of the eighteenth century opened a new era in the history of this instrument; for, about this period, two illustrious obstetricians, Levret in France, and Smellie in England, were struck with the necessity of accommodating the shape of the forceps to the direction and form of the pelvic axis; and, as a consequence, they thus enlarged the field of its application. Chamberlen's forceps was straight, and therefore only applicable when the head was low down in the excavation, and close to the perineum; but both of these gentlemen endeavored to render it capable of being applied to the head when still above the superior strait; and for that purpose

* We may remark that the instrument described by these last-named authors, under the title of Roonhuysen's lever, was not the one which the latter had bought of Chamberlen, for it is composed of a single curved iron blade. In 1747, Rathlauw published a description of an instrument that he had received from Van der Swam, a pupil of Roonhuysen, which was composed of two blades, having *fenestrae* in them, and joined at their extremity by means of a pin.

† This announcement, made at a time when Chamberlen's forceps was scarcely known in France, unjustly obtained for Palfyn the reputation of being its inventor. But, in our day, the question can no longer be considered doubtful, for, independently of the numberless proofs that establish the claims of the Chamberlens, they have recently been confirmed, says Dr. Edward Rigby, by a discovery made in the county of Essex. It appears that Dr. Peter Chamberlen purchased, towards the end of the seventeenth century, the estate of Woodham, Mortimer Hall, near Maldon in Essex, which continued in the family till about 1715, and was then sold to Mr. Wm. Alexander, who bequeathed it to the Wine Coopers' Company. About the year 1815, the tenant in occupation discovered, in the floor in the uppermost of a series of closets, which are built over the entrance-porch, a trap-door. In the space between the flooring of this closet and the ceiling below were found, among a number of empty boxes, a cabinet, containing a collection of old coins, divers trinkets, many letters from Dr. Chamberlen to different members of his family, and some obstetric instruments. These instruments, which were given to Mr. Carwardine by the lady of the mansion, and described by Rigby, exhibit the successive attempts made by the Chamberlens, before they succeeded in perfecting their forceps.

they gave it a curve in the direction of its long axis, in such a way that the anterior border presented a concavity and the posterior one a convexity.

It is impossible to ascertain which of the two had the priority in impressing this important modification on the forceps; for, though it is certain that Levret had such a curved instrument in 1747, and Smellie did not announce his until 1751, yet the latter expressly declares that he had invented it several years previously.

Hundreds of modifications have been proposed since the days of Levret and Smellie, nearly all of which have fallen into oblivion; some of them were quite ingenious, but they imperfectly attained the end their authors had in view; and others were really destitute of value or utility. Consequently, we shall restrict what we had intended to say concerning its history to these few lines, and shall only describe the forceps that is now generally used throughout France, which is none other than that of Levret, very slightly modified.

The forceps is composed of two branches, each of which may be divided into three parts, namely: the blade, the handle, and the point of junction, or the lock. The blade is intended to be introduced into the mother's parts, so as to embrace the head of the foetus; presenting, therefore:—

1. A curvature on its flattened aspect, the internal concavity of which is destined to be applied on the side of the foetal head, while its external convexity slips along the concave walls of the pelvis; 2. A lateral curve on its edge, having the concavity anteriorly, which is made for the purpose of accommodating the form of the instrument to the direction of the pelvic axis; and to render an application of the forceps practicable even when the head is retained above the superior strait. The blade is usually provided with a *fenestra*,

Fig. 93. Fig. 94.



93. The male branch. 94. The female branch.

Fig. 95.



94. The female branch. 95. The forceps locked.

which serves to diminish the size and weight of the instrument; and it has the further advantage of permitting the parietal protuberances to engage in the void thereby produced, which engagement compensates, to a certain extent, the thickness of the branches. The old forceps were provided with a kind of bead around the periphery, and upon the internal face of the blades, which was made quite prominent, and was intended to obviate the slipping of the head. But the contusions on the hairy scalp, produced by this raised border, have led to its removal, and those now in use have the inner surface of the blades polished down with the file. Both handles of the instrument are usually bent to a slight degree, at their extremity, in the form of a hook. One of them is much more curved than its

fellow ; and has, near its end, a grooved canal, that serves for the lodgment of a sharp hook, while the curve of the other scarcely reaches a right angle, so that we find the forceps a blunt and a sharp hook, included in the same instrument. The handles and blades are just alike on both branches, and the latter only differ from each other at their middle or articular part, where one of them is provided with a pivot and the other with a mortise, made either in the middle or else on the side of the instrument, by means of which they can be firmly locked after their application. The branch that bears the pivot has received the name of the *male* (Fig. 93), and the other, having the mortise, that of the *female* branch, or blade (Fig. 94). The delicacy of certain accoucheurs has been shocked by these denominations, and they have endeavored to substitute for them the titles of the *left* and the *right* blades; but I cannot understand why the old names of the blade with the *pivot* and the blade with the *mortise* should not be retained; though I would willingly accept those of the *left* and the *right* ones, if it were clearly understood which ought to be called the *left* and which the *right*. But unfortunately such is not the fact, for M. Velpeau designates that blade as the *right* one which Madame Lachapelle has called the *left*, and *vice-versâ*. This discrepancy of terms creates great confusion in the mind of the reader, which we shall endeavor to avoid by retaining the names of the *male* and the *female* blades.

We shall divide our remarks on the subject of the forceps into three distinct articles; in the first of which will be found the precautions that ought always to be taken before proceeding to an application of this instrument; in the second, we shall point out the general rules applicable to all cases; in the third, the directions peculiar to each position, and shall close the whole by some general considerations on its employment and mode of action.

ARTICLE I.

PRELIMINARY PRECAUTIONS.

The woman is to be placed in the position before recommended for the performance of the version; the lower extremities being sustained by two assistants standing on the outside of the limbs, and having the pelvis firmly held, so as to prevent her from giving way to any involuntary movements that might annoy the operator; of course, the breech ought to be brought to the edge of the bed. The patient should be placed in this position whenever nothing particular prevents, and more particularly when the head is high up, though it is not so necessary when the latter is at the inferior strait. In fact, if she found it impossible to change her posture, we might permit her to remain horizontally on the bed; but it would then be requisite to employ the old straight forceps, or else resort to Smellie's, which is very short, and has but an inconsiderable curvature in the blades. The English practitioners place the patient on her left side, the

position in which the women of their country are usually delivered, taking care, however, to bring the pelvis nearer to the edge of the bed than usual. An assistant, standing on the opposite side of the latter, holds the patient steady, while another raises up and supports the right knee and thigh. But whatever be the position, one attendant is particularly charged with the duty of preparing and handing the blades to the accoucheur, as he may want them.

In order to spare the female the disagreeable sensation produced by an impression of cold, it is customary to warm the instrument by dipping it into hot water. Some care is requisite not to leave it there too long, and, before using, it should be passed through the closed hand so as to be certain there is no danger of its burning the soft parts; besides which, the external surface of the blades should be smeared with some butter, cerate, or oil, with a view of rendering its introduction more easy. Baudelocque has laid down a precept that has been followed by most succeeding authorities, and to which it is advisable to conform; namely, to exhibit the forceps to the patient, concisely explain to her its use, its object, and its mechanism, and to make her understand its harmlessness. "It has not been my fortune," says Madame Lachapelle, "to meet with any one that was not tranquilized by such an explanation, and I have often known persons solicit an application of the forceps in their second labour, which relieved them so much at the first."

Everything being prepared for the operation, we must next ascertain the position of the head with the greatest possible care; for even though it had been recognized at the commencement of the labour, the former diagnosis ought to be confirmed by a fresh examination, lest the head may have changed its position since the travail began. By this exploration, the size of the head, its reducibility, and its softness, the perfect or defective conformation of the pelvis, the degree of retraction, if any exists, &c., will be made out as far as possible; and, as the dilatation or the dilatability of the os uteri is even more indispensable here than in the case of version, we must be certain that this condition exists. After which we are to proceed to an introduction of the blades.

ARTICLE II.

GENERAL RULES.

1. *The instrument ought only to be applied on the head of the fetus*, whether the latter be flexed or extended, that is to say, in the vertex and face presentations; or whether it alone remains behind, presenting by its base after the delivery of the trunk. Certain obstetricians have recommended the instrument to be applied on the pelvis in the presentations of the pelvic extremity, where from any cause it may be desirable to terminate the labour promptly. But the bones of the basin are too deficient in solidity, and their articulations offer too feeble a resistance to be able to support the

pressure made by the forceps without hazard. Besides, it would be difficult to get the breech in the hollow of the blades, without carrying their points above the iliac crests against the soft walls of the abdomen, thereby producing a more or less serious contusion of the abdominal organs. As a general rule, the breech presentations do not appear to me to warrant the use of the forceps. I am aware, however, that M. Stoltz recommends its employment under such circumstances, and I am induced to believe that M. P. Dubois would not hesitate in resorting thereto, in those instances where direct tractions on the pelvic extremity might be difficult.

2. *The blades should be applied as nearly as possible on the sides of the head, in such a way that the concavity of their margins be directed towards that part of the head which is to be brought under the symphysis pubis.*—This rule is not always feasible, for it will be seen hereafter that it is impossible to carry it out in some cases of the transverse positions, in which we are obliged to seize the head over the forehead and occiput; but these exceptions are rare, and the operator should endeavor to follow the rule in all cases. When the forceps is thus applied, each blade bears on the lateral parts of the cranium; the parietal protuberances are found in the opening of the fenestrae, at the point where the blades are the most widely separated from each other; and the occipito-mental diameter corresponds very nearly to a line drawn from the extremity of the blades towards the pivot.

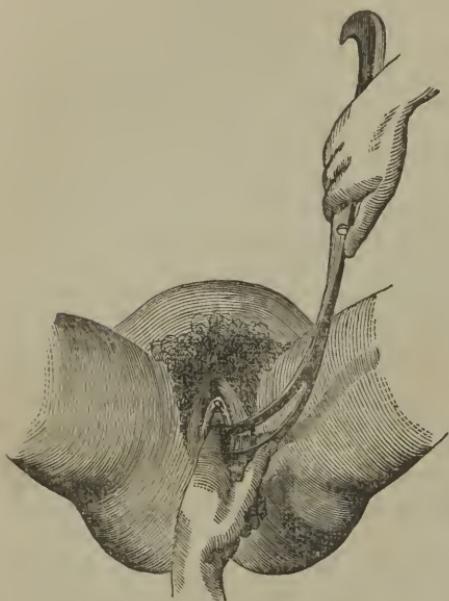
3. *As a general rule, the posterior blade ought to be introduced first.*—As the head is placed in a transverse or a diagonal position in a vast majority of cases, one of its sides will look forwards and the other backwards; and, therefore, one of the blades will be at the fore and the other at the hinder part of the pelvis, since we have just seen that it is requisite to apply them on the sides of the head. Now it is the one that goes to the back part of the basin that we recommend to be generally introduced first. In theory, this is even admitted as the absolute rule, since it is considered to be the most often applicable; for everybody acknowledges that the positions in which the occipito-frontal diameter corresponds to the left oblique one of the pelvis are the most frequent of all. But it must be borne in mind, that in practice there is no invariable law, and the one we lay down is subject to very numerous exceptions. If desirable, however, to establish some guiding principle for the operation, we might say, that the blade which is attended with the most difficulty in its application ought to be introduced first. After all, the skill and tact of the accoucheur can alone decide at the bedside of the patient which branch must be introduced, for it is out of the question to foresee in a book, or even to imitate on the manikin, all the peculiarities that may there influence his decision. For instance, when the head is high up in the excavation, it would be better to reverse the rule, and introduce the anterior blade first.

4. *The male blade is always to be held in the left hand, and is to be applied at the left side of the pelvis; the female blade in the right hand, and it is entered at the right side of the pelvis.*

5. *The free hand, or the one not engaged in holding the blade, should always be introduced first, so as to direct the latter.*—When the head is at the inferior strait, it is usually sufficient to pass in two

or three fingers between the side of the head and the pelvis (*vide Fig. 96*) ; but whenever it is high up, the whole hand must be introduced into the vagina, taking the precaution to place the ends of the fingers between the head and the os uteri, so as to be certain that the blade, by slipping along the palmar surface of the hand will get into the uterine cavity, and not pass externally to the cervix by perforating the cul-de-sac of the vagina and penetrating into the peritoneum. The convex surface of the blades glides along the palmar face, and the convex margin along the cubital border of the hand ; in a word, this previous introduction of the latter is intended to protect

Fig. 96.



Introduction of the first branch.

the vaginal wall from the contact of the instrument.

6. *At what part of the pelvis should the blade be first introduced?*—This question has been variously answered : thus, Baude-locque directs it in nearly all cases immediately on the point where it is to remain after the locking. Levret (and M. Velpeau adopts nearly the same view) recommends that the two blades be introduced at the posterior quarter of the pelvis ; that, in the diagonal positions, one of them be left in front of the sacro-iliac symphysis, but the other be brought forward opposite to the cotoyloid cavity which corresponds with the anterior side of the head, by making it traverse the whole lateral moiety of the basin from behind forwards. Lastly, Madame Lachapelle has proposed a mixed method, composed, in part, of both of the preceding : namely, both branches are first introduced in front of the sacro-sciatic ligament, and then the one which should remain posteriorly is pushed directly up to the sacro-iliac articulation ; but the other is brought forward at once opposite to the cotoyloid cavity in the following manner : “ I insinuate the extremity of the blade just in advance of the sacro-sciatic ligament ; then, as it passes in, I gradually depress the handle between the thighs, until it is inclined low down below the level of the anus ; by this manœuvre, the point of the blade is made to describe a spiral movement, which is directed and completed by the fingers introduced

into the vagina. By this movement, the blade is carried upwards and forwards at the same time, so that it is made to pass around the head in an oblique direction, which would be represented by a line extending along the interior of the pelvis from the sacro-sciatic ligament to the horizontal branch of the pubis." This mode of procedure is also adopted by M. P. Dubois, and it is the one which appears to us the most simple of all. It should be understood, however, that it is not applicable where the head is already engaged in the excavation. The reader will see, hereafter, that above the superior strait the branches are applied on the sides of the pelvis without any particular reference to the position of the head. Finally, some of the German accoucheurs recommend the blades to be placed on the sides of the basin in all cases.

7. *The second blade is always introduced above and in front of the first;* so that, in some instances, the male branch is found over the female one, as in Fig. 97; i. e. between it and the symphysis pubis. It will then be necessary, in locking the blades, to cross the handles, by making the female one pass above the male. Attempts have been made of latter time to avoid this crossing, and a particular kind of forceps has been devised by Tureaux, Tarsitani, and some others, for the purpose, which can be made to lock whatever may be the relative position of the handles. This is doubtless an advantage, but its importance has certainly been greatly exaggerated.

8. *No force should ever be used in pushing the blades up.*—The obstacles met with during their introduction are nearly always created by some folds of the scalp or vagina, in which the point of the blade becomes entangled; or else the difficulty is owing to the circumstance that the blade, being improperly directed, is not pushed up in the line of the pelvic axis, and consequently it strikes against the vaginal walls. These are easily obviated by varying the direction of the instrument a little, or by carrying its handle towards one or the other thigh, and by depressing or elevating it in a slight

Fig. 97.



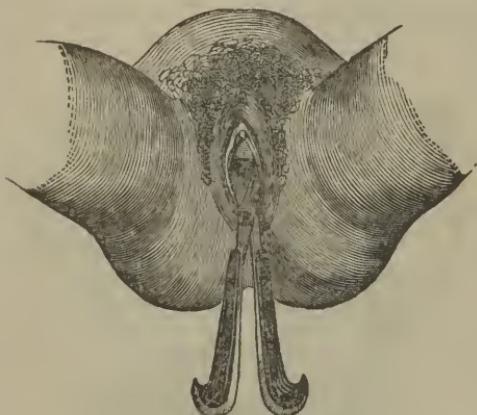
Introduction of the second branch.

degree. Force is always useless and may be injurious. For instance, if the point of the male blade were arrested by some of the folds made by the cranial integuments, the instrument should be partially withdrawn, and its handle be carried towards the right thigh, whereby the extremity of the blade would be somewhat removed from the head, and it could thus pass beyond the obstacle; but if, on the contrary, it were arrested by one of the transverse vaginal folds, the handle should be carried towards the left thigh, so as to make the point rest against and slip over the head.

9. In general, the locking is easily effected, by bringing the two branches together after their introduction and adjusting the pivot in the mortise (*vide Fig. 98*), when an assistant turns the former; but this part of the operation demands a perfect parallelism between the two portions of the forceps, which, unfortunately, does not always occur.

For it happens many times that the pivot does not fit into the mortise exactly, either because one or both blades are turned outwards, or because one has penetrated deeper than the other. In the former variety, we should endeavor to

Fig. 98.



The forceps applied and locked.

correct the deviation gently, by grasping the handles with the whole hand, and in the latter by withdrawing or pushing up one of them. But in none of these attempts should much force ever be used; for when a considerable difficulty is met with, it is probably owing to an improper adjustment of the instrument, and it is far better to extract one or even both blades than to force their locking.

10. *We must be satisfied that the head is properly secured, and that it alone is included in the claws of the instrument.*—To be convinced that no part of the mother's organs is pinched between the head and the forceps, it is only requisite to make a moderate pressure on the handles, after the locking, when, if the patient does not complain of pain, the operation may be continued without danger; but, on the other hand, the forceps ought to be unfastened, and the included part be removed by the finger. A few gentle tractions made by the forceps, without compressing the head too much, will serve to show whether the latter is properly secured, and that the instrument does not slip.

11. *The tractions ought to be made in the direction of the pelvic axis.*—If the head is at the superior strait, we must first draw downwards and backwards as much as possible; then, as it descends into

the excavation, the handles are gradually brought towards the front, so that, by the time it reaches the inferior strait, they are found directed forwards and somewhat downwards; and the tractions will then be made in this latter direction. But whilst the head is undergoing its movement of extension, the instrument must be carried up in front of the symphysis pubis, and afterwards of the abdomen, in such a way that, after the complete delivery of the head, the forceps shall be lying almost horizontally over the woman's belly.

The tractions are to be made during a pain whenever possible, and the patient should be encouraged to bring the abdominal muscles into play, in aid of the uterine contractions and the efforts of the accoucheur. As soon as the head has cleared the inferior strait, and when it only has the resistance from the soft parts to overcome, the vulva being at the same time freely dilated, all tractive force should, as a general rule, be abandoned, and the travail be left to the powers of nature; for the mere presence of the head at the external parts, by the tenesmus it gives rise to, will most certainly bring on a sufficient degree of contraction to effect the delivery.

Be satisfied, then, with facilitating the process of extension, by carrying the handles up in front of the pubis during the mother's bearing-down efforts; the dilatation of the vulva, being thus slow and gradual, will be accomplished without any danger of rupture, especially if you are careful to sustain the perineum, or, still better, to have it supported by an assistant; for, had you continued the tractions, such a rupture could scarcely have been avoided. Madame Lachapelle even advises the instrument to be withdrawn altogether; but I think it is better to leave it *in situ*, for the double interest of the patient and accoucheur; of the patient because, in some cases, a few tractions may yet be necessary; and of the physician because, if he remove the forceps from prudential motives, and with a view of saving the parts, before the final delivery of the head, he might be regarded by the woman and her attendants as a bungler, who had failed in his operation. He should, therefore, leave it applied, and allow the patient to expel it and the head together.

In cases attended with difficulty, we might doubtless draw on the handles with a moderate degree of force; but the example of certain practitioners who, taking a point of support by placing a foot against some solid body, hang, as it were, on the handles of the forceps, and then pull away with all their strength, should never be followed. It is only necessary to use the arms, and the operator should take such a position that his body would always arrest any sudden slipping of the blades. In fact, it is this precaution which sometimes renders an application of the forceps so excessively fatiguing to him.

12. *In the oblique or transverse positions, such a movement of rotation is to be imparted to the head as shall bring the concave margin of the blades directly in front.*—This rotation ought to be performed during the tractions, just as the head is approaching or clearing the inferior strait. But there is no occasion for any violent exertions, for most generally the head turns in its descent, carrying

the instrument along with it in the rotation. Sometimes, also, an application of one or both blades is all that is necessary to effect this change.

ARTICLE III.

SPECIAL RULES.

We have already stated that the forceps may be applied in the vertex and face presentations, and on the head when left behind after the delivery of the trunk. Its application is, therefore, to be studied in these three varieties; and, as the greater or less elevation of the head greatly influences both the course to be pursued and the degree of facility by which the operation is accomplished, we shall examine those cases successively in which it has reached the inferior strait, in which it is still engaged at the superior strait, and in which it is even altogether above the latter.

§ 1. APPLICATION OF THE FORCEPS IN VERTEX POSITIONS, WHERE THE HEAD HAS REACHED THE INFERIOR STRAIT.

The vertex, having descended to the perineal strait, may be found in correspondence with the various points of its circumference; and, therefore, to meet every possible case, we shall have to admit eight principal positions of it: for example, the occiput may be in relation with both extremities of the coccy-pubal diameter (the occipito-anterior and occipito-posterior positions); with both extremities of each oblique diameter (the left anterior and the right posterior occipito-iliac, and the right anterior and the left posterior occipito-iliac positions); and with both extremities of the transverse diameter (the left and right transverse occipito-iliac positions).

A. *Occipito-anterior Position.*—In this position, the occiput is placed behind or under the lower part of the symphysis pubis; the sides of the head corresponding to those of the pelvis. The male blade will here be introduced first, because it will be found underneath in the locking. Two or three fingers of the right hand having been passed into the vagina, this branch is seized by the left hand, either with the fingers, like a writing pen, or, still better, with the whole hand (though in both cases close to the pivot), and it is held inclined obliquely over the right groin; the point of the blade is then entered at the vulva in the direction of its axis, and it is slipped up along the palmar surface of the fingers; as the blade is passed into the vagina, the handle is gradually depressed between the woman's thighs (of course, always approaching towards the median line) in such a way as to direct the point of the blade in the direction of the axis of the excavation. The blade is thus directed at once upon the side of the head, and along that of the pelvis, where it is ultimately to be placed. While this manoeuvre is being effected, the convex border of the blade ought to rest upon and glide along the ring finger of the right hand, which is in the vagina,

whilst at the same time its concave surface should bear exactly on the head's convexity, and follow its outline. The female blade is then introduced in the same manner precisely. Two or three fingers of the left hand are first passed in on the right side of the pelvis; the branch being held obliquely by the right hand in front of the left groin, with its point resting on the palmar surface of the left hand, is presented at the vulvar orifice; and, as its end is made to enter, the handle is depressed, and drawn towards the median line by degrees, and the blade is then passed up on the right side of the pelvis, with the same precautions as in the former case.

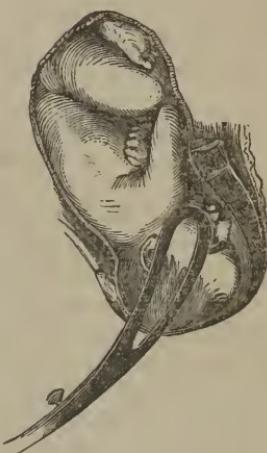
When both blades have penetrated to the same depth, they ought to be parallel with each other, the pivot corresponding to the mortise exactly; and the locking is then completed without difficulty.

As the head is at the inferior strait, the first tractions will have to be made in the direction of the axis of this strait, that is to say, a little downwards and forwards; then, as soon as the occiput has passed under the sub-pubic ligament, and the head has commenced its movement of extension, the instrument is to be gradually carried upwards in front of the symphysis and abdomen.

b. Occipito-posterior Position.—The blades are applied and locked as in the preceding case. But here, notwithstanding the head is at the inferior strait, we are not to draw in the line of axis of this strait; because, in these occipito-posterior positions, the occiput ought to be delivered first at the anterior perineal commissure. (*Vide Natural Labour.*) To effect this object, it is indispensably necessary to carry the handles a little upwards at the very onset of the tractions, so as to flex the head on the chest more completely; being careful to operate in such a way that the artificial aid may bear particularly on the head's larger extremity. When the occiput has gained the perineal commissure, the traction is discontinued, or rather, if there is any further occasion for it, we may draw moderately, by depressing the handles of the instrument towards the anus.

c. Left Anterior Occipito-Iliac Position.—In this position, one side of the head looks forward and to the right, the other backward and to the left; and the blades are to be applied in a corresponding manner on the sides of the head. The posterior blade, which should be entered first, will at the same time be on the left, and, therefore, the one that is always passed on the left side of the pelvis, that is to say, the male blade, will be introduced first. This is held in the

Fig. 99.



The forceps applied on the child's head in the occipito-anterior position, at the inferior strait.

left hand just in front of the right groin ; and its point, placed near the left sacro-sciatic ligament, is to be pushed directly backwards as far as the sacro-iliac articulation, whilst the operator depresses the handle and draws it towards the median line. In carrying the handles down between the mother's thighs, it is highly important to keep the blade slightly everted. Being once introduced, the handle is given to an assistant, who holds it near the internal face of the left thigh.

The female blade is to be placed behind the right cotyloid cavity, where the side of the head is found, by making it describe the spiral movement alluded to when speaking of the general rules of the operation. The operator accomplishes this by taking it in the right hand, in the usual way, and entering the point of the blade just in advance of the right sacro-sciatic ligament; then, pushing it in this direction for about an inch, he suddenly changes the position of his hand so as to get hold of the instrument by its upper face, when, by strongly depressing its handle along the internal surface of the left thigh, he makes the blade execute a see-saw movement, by which it is passed from the right sacro-sciatic ligament up opposite to the cotyloid cavity of the same side ; and then the locking is effected.

During the early tractions he should endeavor to rotate the head so as to bring the occiput behind, and then under the symphysis pubis. The rest of the delivery is completed as in the first variety (A).

D. Right Posterior Occipito-Iliac Position.—The forceps are applied here exactly in the same way as they were in the preceding case ; the blades being entered, the one behind and to the left, the other in front and to the right (*vide Fig. 100*) ; their concave margins looking towards the forehead. As this latter part must be brought in front, the object of the rotation will be to get it behind the symphysis pubis, and the occiput into the hollow of the sacrum ;* and the labour is then terminated just as in an original occipito-posterior position (B).

Fig. 100.



Application of the forceps in the right posterior occipito-iliac position. (4th position.)

* No attempts should be made, in the occipito-posterior positions, to bring the occiput in front ; for although it is true that this movement is accomplished in natural labours, yet in them the trunk, on which the womb's contraction is still exerted, participates in the head's rotation. But, should we attempt to imitate this movement by the forceps, it is nearly certain that the child's body would be so firmly retained by the retracted uterus that it could not participate in the rotation, and that an excessive torsion of the neck, with the mortal lesions following in its train, would be the almost inevitable consequence.

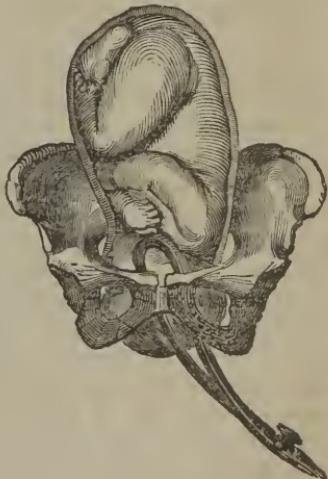
E. Right Anterior Occipito-Iliac Position.—In this case, the female blade is entered just in advance of the right sacro-iliac articulation. Then the male blade is introduced in front of the left sacro-sciatic ligament, and is made to describe the spiral movement before indicated, by which it becomes placed opposite to the left cotoyloid cavity. The movement of rotation will be effected from right to left, and the occiput be brought under the pubic arch.

F. Left Posterior Occipito-Iliac Position.—The blades are introduced in a similar order, and in the same way, as the preceding case. The movement of rotation is also effected in the same direction, but here it will bring the forehead instead of the occiput behind the symphysis. The handles of the instrument are next carried up a little in front of the pubis, with a view of freeing the occiput first at the anterior perineal commissure. After this is accomplished, the handle is to be depressed towards the anus, so as to assist the head in its movement of extension.

G. Left Transverse Occipito-Iliac Position.—In this variety, the occiput corresponds to the left extremity of the transverse diameter of the pelvis; one side of the head looks directly forward, and the other backward. Here also the posterior blade is to be introduced first: now to distinguish which will be the posterior one under such circumstances, we must ascertain to what part of the pelvis the present posterior side of the head will correspond after the rotation shall have been completed. As this process of rotation, in the transverse positions, must always bring the occiput in front, the left, or posterior side of the head, will then look towards the mother's left ilium, and consequently the left or *male* blade is entered first. This blade is, therefore, pushed towards the left sacro-iliac articulation, and when it has penetrated to the proper depth it is pressed into the hollow of the sacrum by bearing on its concave margin with the fingers already in the vagina. The female blade is next to be passed up by means of a spiral movement, behind the right acetabulum; and then the hand in the parts must endeavor to work it towards the median line, by pressing on its convex margin, so as to get it just behind the symphysis pubis. From the extent of the rotation to be effected, of course the physician must be very careful to operate slowly and gently.

When the head is in a transverse position, it is occasionally still high up in the excavation, even though it has, in a great measure, cleared the superior strait; and when this occurs, it is often exceed-

Fig. 101.



The forceps applied and locked in the left transverse occipito-iliac position.

ingly difficult to apply one of the blades in front and the other behind; in some cases even, we are obliged to enter them on the sides of the pelvis, that is, to seize the head by the forehead and occiput. This is always an unfavorable circumstance; although it may possibly happen that the mere application of the instrument will be sufficient to give the head an oblique or even a direct antero-posterior direction; and when this movement does not take place at the time the blades are entered, it is often effected afterwards by their locking, or during the first tractions. Again, when the forceps is thus applied, the head may occasionally clear the inferior strait in a transverse position; but, having reached the vulvar orifice, it then turns between the blades, or, as I have several times observed, carries the instrument along with it in the movement of rotation, in such a way that, when the occiput is turned forwards, the concave border of the blades looks towards one side. In this latter case, some practitioners recommend the instrument to be withdrawn as soon as the head has nothing but the resistance of the soft parts to overcome. I think it would be better to remove the forward or sub-pubic blade only, for its presence might retard the process of extension, but to leave the perineal one applied, because, in case of necessity, it may act as a lever in facilitating the extension.

II. *Right Transverse Occipito-Iliac Position.*—In this position, the application of the forceps scarcely differs from the one just described, excepting that the female branch is introduced first, and the movement of rotation is to be made from right to left, and from behind forwards. When the occiput gets behind the symphysis pubis, the labour is to be terminated as in the preceding case.

§ 2. APPLICATION OF THE FORCEPS IN THE VERTEX POSITIONS, WHERE THE HEAD IS STILL ENGAGED AT THE SUPERIOR STRAIT.

Whenever the head is engaged or locked in the superior strait, and the vertex occupies the whole upper part of the excavation, the rules for guiding us in the application of the forceps are very similar to those already laid down for its use at the inferior strait. We must remark, however, that its elevated position renders an introduction of the whole hand into the vagina more necessary than ever; that the points of the fingers ought to be carefully placed between the head and the cervix uteri, so as to direct the blade, which is slipped along the palmar surface of the hand, directly into the uterine cavity; that, as it is higher up than usual, the blades are to be pushed further in, in order to grasp it freely; and, lastly, that, as the head is not yet clear of the superior strait, the first tractions must be made in the direction of the axis of that strait, or, in other words, as far backwards and downwards as possible.

But, although the theoretical precepts remain unchanged, it must not be supposed that the difficulties are no greater here than in the former case; for the elevation of the part renders the application of the forceps more difficult and less certain, as it is not an easy matter to apply the blades on the sides of the head, in the oblique and more especially in the transverse positions. In a word, the

higher up it is, the more likely are we to encounter those difficulties and dangers about to be described in applying the instrument on a movable head above the brim of the pelvis.

§ 3. APPLICATION OF THE FORCEPS IN THE VERTEX POSITIONS, WHERE THE HEAD IS MOVABLE ABOVE THE SUPERIOR STRAIT.

There are many circumstances that may require the intervention of art, even while the head is still above the abdominal strait; and, as the nature of the sources of dystocia may have a bearing on the operative procedure for terminating the labour, we must here digress a little for their consideration.

The resources of our art may be rendered necessary by any accident that endangers the life of the mother or child, such as hemorrhage, convulsions, or a descent of the cord, etc., as also by a contracted pelvis or an excessive volume of the head. In the latter case, a resort to the forceps is indispensable, provided the disproportion between the pelvic dimensions and the size of the head be not very great; since it has elsewhere been shown (*vide Vices of Conformation in the Pelvis*) that, whenever the smallest diameter of the basin amounts to three inches, there is reason to expect that a delivery can be effected by means of the forceps.

The question arises whether the version or an application of the forceps is to be resorted to in those cases where the pelvis is properly formed, but some accident has taken place that requires a speedy termination of the travail? Under such circumstances we do not hesitate to recommend the pelvic version; but, as this is not the universally received opinion, we extract from Madame Lachapelle the following reasons on which we ground our preference.

"An application of the instrument upon a head which is still above the superior strait is both a difficult and a dangerous operation. Difficult, 1st, because its elevation renders the diagnosis of the position obscure, and often leaves us operating in the dark; 2d, from its mobility it escapes from the forceps, and, not unfrequently, it is merely held by the points or margin of the blades; so that, as soon as any resistance is met with from the first tractive efforts, it slips out just like a cherry-stone when squeezed between the fingers; and, 3d, because at this height it is impossible to apply the blades on the sides of the head, since the latter is usually found either in an oblique or in a transverse position. Now, to conform to the rule generally laid down, we should apply one blade in front and the other behind, but this is obviously impracticable, for the curvature of the pelvic axis prevents the forceps from passing far enough in, unless the blades are introduced along the sides of the basin.*

* When an attempt is made to apply them over the parietal regions, the perineum presses the instrument forwards, and gives it such a degree of obliquity with regard to the superior strait, that there is not room enough between the fenestrae for the reception of the smallest-sized head. The latter, being placed above the abdominal strait, has its long diameter situated very nearly in the line of the axis of that strait; but as the long axis of the head ought to correspond with that of the blades, it therefore follows that the forceps must be

Dangerous, because the hold on the head, being very imperfect, in consequence of the difficulties just enumerated, the instrument may slip; and, should such slipping take place while we are making strong tractions on the handles, the edges of the forceps, acting like a cutting instrument, might seriously wound the cervix."

We therefore prefer the version in the case under consideration. However, there is one instance which might demand the use of the forceps: that is, where the uterus is so contracted on the child's body after the discharge of the waters, as to render an introduction of the hand or an evolution of the foetus absolutely impossible; but, fortunately, in such a case, the head would be so firmly held at the strait, during the strong contractions of the organ, as to be nearly immovable.

On the whole, then, the application of the forceps above the superior strait should be limited to those cases of pelvic deformity in which the shortest diameter of the pelvis does not exceed three to three and a quarter inches, and those where the uterus is firmly retracted.

But, whatever be the position, the blades are to be entered in the usual way along the sides of the pelvis. In most cases, it would be advisable to tie the handles together before drawing upon them. At first, the tractions should be made as far back as possible, and the instrument ought to be gradually brought forward as the head descends into the excavation. Where the head is transverse, and is seized by the forehead and occiput, or, if oblique, by one coronal boss and the opposite occipital protuberance, it will soon reach the inferior strait. In thus traversing the whole excavation, the head may possibly turn within the blades and become converted into an antero-posterior position; but it may also happen that this spontaneous version does not take place at all. If, therefore, the obstacle exists at the superior strait alone, and the uterine forces appear adequate to the prompt termination of the labour, we may withdraw the instrument and trust the rest to nature. But in other cases I think it would be proper to endeavor to transfer the blades to the sides of the head, or even to reapply them in accordance with the precepts before given for their application at the inferior strait.

§ 4. APPLICATION OF THE FORCEPS IN THE FACE POSITIONS.

When the face presents, an application of the forceps may become necessary, either where the head has descended to the inferior strait, where it is engaged at the superior one, or where it is still movable above the brim of the pelvis.

1. *Where the Head is at the Inferior Strait.*—If both the head

introduced in the direction of the axis of the upper strait; and, consequently, that the instrument's articular part is to be depressed beyond the point of the coccyx. But the perineal resistance will evidently prevent this, where one blade is entered behind the pubis and the other in front of the sacrum. Therefore we are obliged to introduce the blades along the sides of the pelvis; that is, to seize the head by the forehead and occiput in the transverse positions, and by the coronal and occipital protuberances in the oblique positions.

and the pelvis retain their usual size, the face can only reach the perineal floor by descending with the chin directly forwards, or nearly so. (*Vide Mechanism of Face Positions.*) As the application of the forceps in these three different cases does not differ in the least from that described in the corresponding vertex positions, we deem it useless to pass over the same ground.

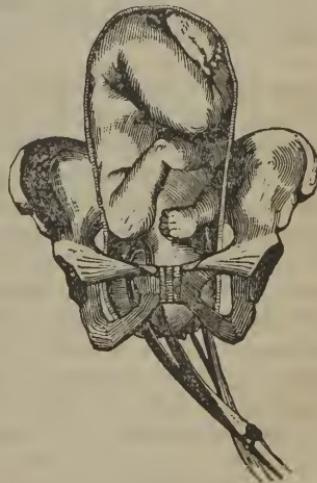
But the face, without having reached the perineal strait, may, nevertheless, be low down in the excavation; and the process of rotation, whereby the chin is brought under the pubic arch in all cases, may not have commenced at all, or it may either be partially accomplished or fully completed. We might, therefore, have to apply the forceps in a mento-anterior or pubic, in a left or a right anterior mento-iliac, or in a left or a right transverse mento-iliac position.

Further, as it is absolutely requisite, in the face deliveries, for the chin to come under the pubic arch, the instrument is always to be applied with its concave edges looking towards the chin, taking care to introduce the posterior blade first.

By way of example, let us suppose that the face is situated in a left anterior mento-iliac position, and is low down in the excavation. Here, in conformity with the directions before given, the male blade will be placed posteriorly and to the left, near the left sacro-iliac articulation, and the female blade just behind the right anterior arch of the pelvis; when locked, the concave edges of the blades will look forwards and to the left. The rotation is then effected from behind forwards, and from left to right, so as to bring the chin behind the symphysis; and when this is accomplished, we draw directly forwards, and a little downwards, in order to free this part from the pubic arch; and then, after having secured its delivery, the handles are gradually carried up, and moderate tractions are resorted to, with a view of promoting the flexion and disengagement of the head.

2. Where the Head is at the Superior Strait.—The face may be found in every possible relation with the different parts of this strait. Should the chin correspond to any portion of its anterior moiety, an application of the forceps may be accomplished without any particular difficulty; but if the face is in a mento-posterior position, the pelvic or cephalic version, whenever possible, ought to be chosen in preference (*vide page 547.*) For when the forceps is once applied, the object would evidently be to bring the chin behind the symphysis

Fig. 102.



Application of the forceps in the left anterior mento-iliac position. (First position of the face.)

pubis; but the trunk, being immovable from the retraction of the womb, could not participate in the rotation effected on the head by the instrument, and hence there would be a luxation at the joint between the first and second cervical vertebrae, which does not admit of movement beyond the fourth of a circle.

Where the face is situated in a mento-posterior position, and has descended so far into the excavation that it is altogether impossible to return it above the superior strait, with a view of performing the cephalic or the pelvic version, this instrument might be resorted to. Under such circumstances, we should therefore apply the forceps for the purpose of relieving the mother from her threatened danger; not to bring the chin in front, but merely with the intention of flexing the head, and converting the face position into one of the vertex. To accomplish this, the blades are to be placed on the sides of the head, and in operating the handles should be depressed as far backwards as possible, so as to act on the vertex particularly, until the occiput be brought down under the pubic arch; if the chin were directly posterior, such a movement of rotation might be given to the head, prior to any tractive effort, as would carry the former into the great sciatic notch on one side or the other.

This appears to me the most feasible

Application of the forceps in the
mento-posterior position.

operation. I must observe, however, that, according to M. Mascarel (*Thesis*, page 84), M. P. Dubois has proposed another; or rather he inquires whether it would not be possible to convert a mento-posterior into a mento-anterior position. It may be objected, he continues, that, if the head is forced to undergo too great a rotation, and the body does not turn simultaneously, the child's neck would be twisted; but as the only thing to be done, if this will not answer, is to perforate the cranium, and consequently to sacrifice the infant, he considers the former measure preferable; more especially as the chin might escape under the ischio-pubic ramus, without the necessity of getting it exactly beneath the pubic arch. I do not know whether or not M. Mascarel has correctly reported the opinions of the Professor of *la Clinique*, but I can assert that I have never heard him teach such doctrine; and in a case to which he, as well as myself, was called in consultation by Doctor Letannellet, he certainly made no effort to bring the chin in front. This practice originated with Smellie, and I confess that, if the cases reported by the English author confirmed his theoretical views on this point, his opinion would shake my convictions; but, unfortunately, such is not the fact. For on reference to the voluminous record of observations



published by him, I found but four cases of face presentation, where the chin was low down in the excavation, and directed posteriorly; in all of which he first endeavored to push up the head, and, failing in that, he had recourse to the forceps. In one only of these four cases could he bring the chin in front; in a second, he was merely enabled to flex the head by the instrument, but he succeeded in delivering the vertex and occiput first under the pubic arch; in the two others, he had a forcible recourse to the sharp hook; and the same occurred in another instance reported to him by one of his former pupils. Thus, in five cases, one only permitted a rotation forwards, while in all the others this was impracticable.

It is possible that the shape of the instrument may be one of the principal sources of difficulty, and that the operation might be rendered easier by the employment of a straight forceps: this suggestion, which I believe was first thrown out by M. Dubois, is worthy of consideration.

3. *Where the face is still above the superior strait*, an application of the forceps is only to be attempted when the pelvic version is altogether impossible. In fact, it is well known that the face is then usually found in a transverse position. Besides, as previously stated, where the head is so high up, the blades are necessarily applied along the sides of the pelvis; consequently, one of them would come into contact with the child's vertex, the other with its neck, and the pressure made on this latter part would most assuredly compromise the infant's life. We are, therefore, justified in saying that the instrument is only to be introduced as a dernier resort; and that, before using it, an attempt should be made to convert the face position into one of the vertex by the cephalic version, and then apply the forceps on the head in this rectified position.

§ 5. WHERE THE HEAD REMAINS BEHIND AFTER THE BODY IS EXPELLED.

When the head is retained in the mother's parts, after a natural delivery by the breech, or after the pelvic version, an application of the forceps is rarely indispensable, for the hand alone is most usually sufficient to effect the delivery; more particularly in those cases where an extension of the head is the sole cause of difficulty. But where the base of the cranium is arrested by a retraction of the pelvis, the forceps may certainly be very useful, Madame Lachapelle to the contrary notwithstanding.

Whenever an application of the instrument is decided upon, the rules for operating are nearly the same as in the vertex positions; here, also, the blades are placed as nearly as possible on the sides of the head, having their concave edges always directed towards the part that is to come under the pubic arch, etc. We may further add, that it should be entered along the sternal plane of the child, as also, that the body is to be supported, and carried towards that side where the occiput is found, i. e. directly forward and upward in the occipito-pubic positions, forward and to the left in the left anterior occipito-iliac positions, etc. etc.

The blades having been introduced in the usual manner, we are next,

Fig. 104.



Application of the forceps where the head is retained after the delivery of the body.

as a general rule, to attempt the disengagement of the head by a movement of flexion, having the nape of the neck as its centre; which is situated at times under the symphysis pubis, and at others at the perineal commissure.

In one variety alone, would the accoucheur be warranted in entering the forceps along the infant's dorsal plane, and freeing the head by a process of rotation. We mean, where the face is above, the occiput being behind; but this manœuvre, which was recommended by Madame Lachapelle, does not always succeed; for other practitioners are not as fortunate as that skillful midwife in turning the face into the hollow of the sacrum, and then to succeed in applying the instrument. We rather believe, with M. Velpeau, that, relying on the result of the cases reported by Eckard

and Michaelis (*vide page 354*), it might be possible, by means of well-directed tractions, to free the occiput at the anterior perineal commissure, after which the head's delivery would be completed by an excessive degree of extension.

But a much more difficult case may be met with in consequence of an arrest of the head above the superior strait; whether arising from an unusual extension, that could not be remedied by Madame Lachapelle's manœuvre, or from a retraction of the pelvis, which is too inconsiderable of itself to require the use of the forceps. Both Smellie and Baudelocque, who were as skillful as fortunate, have succeeded in its application under such circumstances; but, notwithstanding the great authority of their names, cases of this kind may well be dreaded when such a man as Dewees has always failed in the operation! In fact, what a series of difficulties are here met with! Thus, not to speak of the obstacle to the operation caused by the trunk's filling up the vulvar orifice, we must remark: "1. That, when the head is lodged transversely with regard to the pelvis, as frequently happens, the forward inclination of the upper strait will prevent a secure application of the blades on the sides of the head. 2. That if the head be even grasped by the forceps, it must be in the direction, or very nearly so, of the perpendicular diameter of the child's head, instead of the oblique; a circumstance of great consequence to the success of the operation. 3. This advantageous position of the head for the use of these instruments, may lead to the belief that they are well placed, because their handles unite without difficulty; whereas, they but very partially embrace the head; and

if an effort be made to extract, they will most probably slip, and the uterus, vagina, or bladder be severely injured." (Dewees, p. 341.) Notwithstanding all which, this extreme resource ought to be tried. The rules for its accomplishment are very simple; namely, to carry the trunk towards the part corresponding with the occiput; to depress the chin as much as possible, with a view of diminishing the head's extension; to enter the blades on the sides of the pelvis; and lastly, to operate, as far as practicable, in the direction of the pelvic axes.

If the base of the cranium presented, after the accidental or designed separation of the head from the body, it would be proper, provided the pelvis were well formed, to apply the forceps, after having taken the precaution of placing the head in a proper position; that is, with its smallest diameters corresponding with the plane of the basin, and the occipito-mental diameter with the direction of its axis. Should the deformity be more considerable, the embryotomy forceps will be the only resource. (Vide *Craniotomy*.)

§ 6. GENERAL CONSIDERATIONS ON THE EMPLOYMENT OF THE FORCEPS.

Although an exceedingly useful instrument when employed by skillful hands in proper cases, the forceps, by being badly directed or improperly applied in those where it is not indicated, may give rise to the most serious disorders. It is particularly important, therefore, in closing this article, to point out those instances in which it may be advantageously employed. Besides, this short review will serve to illustrate the precepts just given, and render its mode of action more intelligible.

The forceps has been recommended: 1st, in cases of irregular or inclined vertex and face positions, which are neither corrected spontaneously nor can they be by the unaided hand. 2d. Where a disproportion exists between the pelvic dimensions and the size of the head; whether dependent on an excessive volume of the latter or a contraction of the former. 3d. Where any accident, serious enough to compromise the life of the mother or child occurs during the travail, which is not remediable by the version. 4th. Lastly, where the head has descended to the pelvic floor, and is there arrested either by the resistance of the soft parts or by a brevity of the cord.

1. *Inclined Vertex or Face Positions.*—As heretofore stated, we consider an application of the forceps preferable to the lever in these cases, after the inefficiency of the natural powers has been fully determined by a delay of seven or eight hours. In fact, we believe that a prompt delivery is equally demanded for the benefit of the mother and the child, and that the forceps alone can accomplish this result. Moreover, as the inclined or parietal positions are nearly always transverse, it is unnecessary to add, after what has been elsewhere said, that the blades are to be entered on the sides of the pelvis; and that, as the head descends into the excavation, it will probably undergo a process of rotation, whereby it will be con-

verted into an antero-posterior position.* By proceeding in this manner, we will avoid, according to Dugès, the difficulties of a direct antero-posterior introduction as regards the pelvis, and the dangers to the foetus from a bi-parietal application; for it must be obvious that, if the inclination were considerable, one of the blades would bruise the upper part of the neck.

2. *Retractions of the Pelvis.*—The ultimate limit to which we restricted the use of the forceps (*vide page 476*), was three inches; because any reduction we could hope to obtain in the diameters of the head beyond that, would not, as a general thing, be great enough to permit it to pass through the contracted diameter of the pelvis. In truth, the enlarged experience of Baudelocque has proved that, when the forceps is applied in the direction of the bi-parietal diameter, the greatest reduction obtainable, without compromising the child's life, is not more than half an inch. Now this diameter, on a well-formed head, averages from three and a half to three and three-quarter inches, and even supposing that we can reduce it half an inch, there will still be left three inches at the least.

Certain practitioners, having observed that the head became gradually moulded to the shape and dimensions of the pelvic cavity, by the efforts of the womb alone, in some cases where the basin was contracted to less than three inches, have, therefore, imagined that the resources of art could accomplish what nature alone sometimes effects; that by the forceps a similar reduction in the head's diameters might be obtained; and, consequently, that the instrument could be usefully applied where the retractions are even less than three inches. But they have instituted a comparison between two forces that are wholly dissimilar. Indeed, there can be no doubt that the expulsive efforts of the womb have succeeded in forcing the head through the pelvis where the smallest diameter did not exceed two and three-quarter inches; but this result was only effected after a tedious labour of thirty, or forty, and even of sixty hours; and where the slow and gradual compression, to which the head was then subjected, has enabled the brain to accommodate itself thereto by degrees. While, on the contrary, the reduction obtained by the forceps, is produced by a force that does not extend beyond half an hour or an hour at the most. Now, everybody knows that a tumor, whose development extends over a period of several years, may exist within the cranial cavity without giving rise to any serious disturb-

* This phenomenon occurred in a lady, in la rue St. Paul, to whom I was called by Doctor Ducros, about seven o'clock in the evening. The membranes had been ruptured since eight, A.M.; the head was situated in a transverse occipito-iliac position, and was inclined on its anterior parietal region; it had not made the least progress since morning, and was so inconsiderably engaged at the superior strait, that I was forced to introduce nearly the whole hand for the purpose of ascertaining the position: the waters had escaped, and I attempted in vain to effect a reduction; but an application of the forceps, made in the manner above indicated, was attended by the happiest results.

The head descended, and rotated within the blades, and in less than five minutes the child was born living.

The lying-in exhibited nothing unusual.

ance, whilst a little drop of blood, suddenly effused, brings on a paralysis at once. Consequently, the pressure made by the forceps may kill the child by its sudden action, notwithstanding the reduction is absolutely less than what nature herself sometimes produces after several hours of suffering.

But, where the pelvic diameters exceed three inches, the forceps may prove very useful; though I am induced to believe that the character of its action has been misunderstood, by supposing that it serves both as an instrument of traction and as one which is calculated to reduce the head's dimensions by its pressure. Let it be understood that the forceps merely acts here as an instrument of traction.

In fact, the contraction usually exists at the superior strait, where it is particularly apt to affect the sacro-pubic diameter; and, as the head always has a tendency to present its long diameters to those of the pelvis, when retained above, it is generally found in a transverse or an oblique position (more frequently the former). Its bi-parietal diameter will, therefore, correspond to the smallest one of the strait, and of course the blades of the forceps should be applied in the direction of this diameter; but we have shown that such an application is not possible in any case, and this impossibility is still more evident where there is a retraction. The forceps will then have to be entered along the sides of the pelvis, and any pressure made by it will, of necessity, bear on the occipito-frontal diameter. Now, although the experiments of Baudelocque may have proved that the head, when flattened in one direction, is not very sensibly enlarged in another, yet can it be supposed that a reduction effected in the occipito-frontal diameter would at the same time diminish the bi-parietal one, which is perpendicular to it? How, then, does the forceps act? Simply by its tractive power, which, conjoined with the uterine contractions, induces the head to engage in the excavation; when, of course, as the parietal protuberances correspond with the antero-posterior diameter, the bi-parietal one becomes compressed between the pubis and sacrum; the pelvis itself acting here as the compressory agent, and not the forceps, which latter merely facilitates the process by its tractions. This view of its action demonstrates, at least, the uselessness, if not the danger of those powerful efforts sometimes resorted to by accoucheurs for the purpose of compressing the head, and reducing its size; for when the head is well grasped by the instrument, all that is requisite is to tighten the latter enough to prevent it from slipping during the operation. If the forceps can ever be used as a mean of reduction, it is only where the head is arrested by a retraction of the bis-ischiatric diameter.

3. *Accidents.*—It is only necessary to recall the conditions in which the version is practicable, to show the part the forceps may play in those accidents that require a speedy termination of the labour. We need not mention the dilatation or dilatability of the os uteri, for this is indispensable to both operations. Should a completion of the delivery be deemed imperative, when the head has

cleared the cervix, or is low down in the excavation, we would apply the forceps; but, on the contrary, if it be but little or not at all engaged at the superior strait, the version would be preferable (*vide page 677*), unless there was such a degree of retraction in the pelvis, or the womb was so firmly contracted, as to render an introduction of the hand unusually painful, or even impossible.

4. *The Resistance of the Perineal Muscles* is one of the most common reasons for resorting to the instrument; for, nine out of every ten applications of the forceps are made for the purpose of extracting the head, which has been detained at the pelvic floor for four, five, six, or seven hours; indeed, if the measures recommended on page 481 have proved ineffectual, this is our only resource. But, even here, it is possible that obstetricians have been in error with regard to its modus operandi, since every one, who, like myself, has frequently had occasion to apply it, must have been struck with the fact of how little effort is required, under such circumstances, to effect the head's delivery. For, where this part has been retained at the same point for seven or eight hours, notwithstanding the most energetic contractions of the organ, and all the uterine forces have been expended on an apparently insurmountable obstacle, the young accoucheur, in resorting to his instrument, may anticipate the necessity of using some considerable force; and yet, as soon as a few slight tractions are made, this great resistance seems to give way at once, the uterine contractions that were so long ineffectual are henceforth adequate, and the patient soon expels the head and forceps together. Far different would be the result, if the head's arrest were altogether dependent on an over-resistant perineum; for the exertion requisite in those cases, where this part has been rendered less extensible by abnormal bands or cicatrices is well known. Doubtless, this resistance from the pelvic floor is the first source, but it is far from being the whole cause of the difficulty.

In my opinion, the following is the true state of the case; when the head, urged on by the uterine contractions, reaches the floor of the pelvis, it is already in a state of flexion, which must certainly increase as the pains become stronger, and the perineum more resistant; for, being placed between two opposite forces, it will necessarily be flexed on the chest to the greatest possible extent. Now, it is this excessive flexion that constitutes the most serious difficulty, for, in this position, the spinal column abuts directly on the occiput, and every expulsive effort transmitted by it has a tendency to depress the latter, and to flex the head; but here an extension can alone effect the delivery. The question recurs how then does the forceps operate? I answer, in a very simple manner; by the first tractions it extends the head, changing this part to a more favorable position relatively to the spine, and thus restores the efficacy of the uterine contractions, which latter are quite sufficient for the subsequent completion of the delivery.

Hence, the reader will understand that, although the perineal resistance is, without any doubt, the original cause of the head's

arrest, yet, in a vast majority of cases, it merely acts by producing an exaggerated flexion; and that, as soon as this is created, it alone constitutes the whole difficulty; a proof of which is satisfactorily afforded by the ease and rapidity of the labour's termination, after the first moderate tractions made by the instrument have effected a partial extension.

5. Lastly, it has been shown how a brevity of the cord may become a cause of dystocia. Where this happens, the forceps is a hazardous resource, that ought to be avoided; but the real source of the delay is generally unknown, and, even if it were not, I know of nothing better to be done.

The period of labour for applying the forceps varies with the cause that demands its use. When any accident whatever renders it advisable to produce a speedy delivery, and the forceps be deemed appropriate, the time for operating will be judged of by the danger of the accident itself; for we are evidently to interfere as soon as there is reason to fear that the life of either the mother or child is involved. When the head is arrested above the superior strait by a contracted pelvis, we might wait in ordinary cases, as elsewhere stated (page 473), for six, seven, or even eight hours after the membranes are ruptured and the os uteri is fully dilated; but a longer delay would expose both mother and infant to the most serious hazard. Again, when the head's arrest is dependent on the resistance of the soft parts, the pressure thereby created on the vaginal walls might eventually determine a gangrene of those parts, and render the patient liable to the vesical and recto-vaginal fistulas, which often result in consequence of this affection. Besides which the foetus, being subjected for a long time to compression, may suffer from the disorder thereby created in the omphalo-placental circulation; and the uterus, having exhausted its energy against these resistances, which it cannot overcome, falls into a state of inertia that continues after the delivery, and becomes then a source of hemorrhage; and, lastly, the inflammation of the womb or vaginal walls that occasionally takes place, may extend to the peritoneum after, or even during the accouchement, and speedily prove fatal. All these dangers are easily obviated by the proper application of the forceps; and though, on the one hand, the abuse of the instrument, by employing it too early, as some practitioners are in the habit of doing, is to be avoided, yet, on the other, we must not virtually interdict its use by trusting too long to the powers of nature. We must again allude to what was previously stated in regard to the importance of observing the stage of the labour at which the delay occurs; thus the time that has elapsed prior to the rupture of the membranes, can have but little influence on the mother's condition, and none on that of the child, so that, even where the travail has lasted from thirty to thirty-six hours, there is often nothing to be done; though if the head were low down in the excavation, and it had made no progress for seven or eight hours, the forceps ought to be applied. But this rule, which is applicable to most cases, admits

of some exceptions; and it would seem useless to add that the state of the patient's health, the strength or feebleness of the uterine contractions, the slowness and intermission, or the regularity of the foetal pulsations, &c., must influence the time of its application. The accoucheur would be justly liable to censure for not acting soon enough, and equally so for recurring too early to the use of instruments.

In addition to the fact that it is never advisable to interfere with the process of nature when it is advancing regularly, an application of the forceps, apparently even the most simple, may prove dangerous to the mother, and still more so to the infant. For a sudden depletion of the uterus, by the inertia it gives rise to, exposes the patient to hemorrhage; the dilatation of the soft parts is not so regularly effected where the head is delivered by the forceps, and there is much more reason to fear a rupture of the perineum, however carefully the tractions be performed. Besides, the compression exerted on the child's head may injure its health, and occasionally endanger its life.

Quite recently, M. Landousy has called attention to the facial paralysis of new-born children, that often follows an application of the forceps; and M. P. Dubois has also alluded to the same fact in his lectures. This palsy, which affects only one side of the face, is caused by the pressure of the blade on the seventh pair of nerves. Owing to the nearly total absence of the mastoid process, and the defective development of the auditory canal, such a compression of the facial nerve just as it escapes from the stylo-mastoid foramen is quite possible. The affection is easily recognized immediately after birth, by the following circumstances: the commissure of the lips is drawn out of place; the nostril is neither so dilated nor so movable as its fellow of the opposite side; the eyelids are open, while those on the sound side are closed; the whole side of the face is distorted, and this deformity, heightened by the infant's cries, gives it a very peculiar expression. As soon as the crying is over, the deformity is so slight as scarcely to be noticed, if the eye on the sound side happens to be open; but when the child cries again, the want of symmetry in the features is once more observable. This difference in the phenomena of the disease, dependent on the face's condition of repose or agitation, is much better marked than it is in the facial hemiplegia of adults. The difference is particularly striking just before it cries, for its face then exhibits alternatives of rest and excitement such as those just described. In the course of a week or ten days these symptoms nearly all disappear, and the equilibrium between the two sides is gradually established. When the compression of the nerve has been moderate, the hemiplegia does not last so long, and occasionally it disappears in a few hours; but in other instances it may persist for a month or two. Hitherto, this affection has never terminated in death, having always passed off, even where no active medication has been employed.

The only precautions necessary in such cases are to protect the eye

from the light; and, where the child's sucking is interfered with by the paralysis, as it occasionally is, to find a nurse having a well-formed nipple.

CHAPTER III.

OF THE LEVER.

THE lever, which Burns has proposed to call the *tractor*, was formerly much used, though, at the present day, it is scarcely ever resorted to; since, in nearly all the cases where this instrument has been recommended, the forceps may be advantageously substituted. It was employed to effect the correction of the head in cases of inclined vertex presentations, to depress the occiput in face positions, to force the head to descend, and to free it from the genital organs. One of the Chamberlens appears to have been the inventor of this instrument likewise, but it has undergone numerous modifications since it became public. The one now in use resembles a branch of the forceps; the blade is provided with a *fenestra*, and is curved on one side so as to adapt itself to the convexity of the child's head; being terminated below by a long, flat stem, which becomes narrower and rounded, so as to fit in a wooden handle, which latter is either continued out in the same line, or else is slightly bent in the opposite direction from the blade.

Those authors who still recommend the lever, make use of it in two ways, and to accomplish two different purposes. At times, they merely desire to correct the head, and then abandon the rest of the delivery to nature; at others, by using the lever as a forceps, they endeavor to extract it. In the latter case, which presupposes, according to the acknowledgment of M. Velpeau himself, that the head is already down in the excavation, I know of no reason for not using the forceps.

Where the correction of the head is the only object to be secured, the hand will, most generally suffice. Nevertheless, if the lever is employed for this purpose, the following is the proper mode of operating: After having introduced it, according to the rules laid down for the forceps, we next endeavor to slip it over that part of the head on which it is to act—over the occiput, when the object is to flex the head, or upon one of the parietal regions in the lateral inclined positions. When it is properly placed, the hand, which is already in the vagina, and which has served to guide the instrument up to its place, grasps it near the middle, so as to form a fulcrum, as it were, whilst the other hand having hold of the handle, presses in a direction opposite to the one the head is to take; thus making the instrument act as a lever of the first kind. In some cases, the hand at the exterior serves as the fulcrum by fixing the handle,

while the other, acting on the middle of the lever, gives the blade the requisite movement; the instrument then acts as a lever of the third kind.

Fig. 105.



The mode of using the lever to pull down the occiput, or to flex the head.

As hitherto stated (page 549), the lever might prove very serviceable in some of the posterior positions of the face, when too far engaged to admit of version. Where it is used for flexing the head and depressing the occiput, it is passed like a blade of the forceps directly upon the vertex, and as much as possible on the occiput. (Fig. 105.) Then, by operating in the manner just indicated, we attempt to convert the face presentation into one of the vertex.

Some practitioners are in the habit of attaching a loop near the middle of the instrument, either to give it a *point d'appui* other than the symphysis pubis, or to convert it into a lever of the third kind; the fillet, drawn by one hand, becoming the active power.

CHAPTER IV.

INDUCTION OF PREMATURE LABOUR.

THE title of premature artificial delivery is applied to a labour that is designedly induced prior to the ordinary term of pregnancy, but not before the foetus is viable.

No obstetrical operation has ever been more warmly or more profoundly criticised than this. In fact, it has been supported or condemned by the leading accoucheurs of all countries, and as a consequence of this disagreement among the masters of our art, no part of obstetrical science has ever been studied with greater care. To trace out the first dawning of the induction of premature labour, we should have to go back through the gropings that characterize all human works, to the manœuvres of Aspasia, to the forced dilatation of the os uteri recommended by Louise Bourgeois and J. Guillemeau, or to the more gradual procedure of Puzos. But in all of these methods, the principle differs wholly from the operation under consideration; for, "in a *premature* delivery, nature accomplishes nearly everything, art merely contributing a slight, though certain impulse; whilst in the *forced* labours, art acts almost alone, for all

that nature yields must be drawn from her by a renewed force." (*Ritgen.*)

Under this important distinction, we believe there can no longer be any doubt that the induction of premature labour had its origin in England, for, according to some writers, Mary Donally, a mid-wife of that country, first performed it in 1738; but most of the English authors look upon this as a gratuitous assertion. The judicious Denman states "that, about the year 1756, there was a consultation of the most eminent men at that time in London, to consider of the moral rectitude of, and advantages which might be expected from, this practice, which met with their general approbation. The first case in which it was deemed necessary and proper, fell under the care of the late Dr. Macaulay, and it terminated successfully." His example was soon followed by numerous imitators.

From Great Britain, this operation shortly passed to Germany, where it was proposed by A. Mai, of Heidelberg, in 1799, but Wenzel first put it in practice in 1804. Owing to his success, and the publication of Reisinger's remarkable work, it has since been supported by numerous and zealous partisans. It has been performed a number of times in Holland by Salomon, Welenbergh, and Schow; Lovati has been equally fortunate in Italy; and the periodical works of Denmark, of America, Switzerland, and Poland, have severally reported interesting cases of delivery before term.

In France, the reception of this operation into our practice is quite modern; indeed, for a long time prior to its admission as a valuable resource, it was rejected as a crime. Roussel de Vauzesme proposed it as early as 1779, though it then received but little attention. It was imperfectly understood for a very long period, and we may doubtless attribute the blind and passionate opposition of Baudelocque and his pupils, to their want of a clear and definite idea of what might be expected from its employment. Foderé, however, persisted in recommending the premature delivery, on several occasions, notwithstanding the anathemas of this celebrated school. In 1830, M. Burchardt, in a remarkable thesis on this subject, sustained its propriety at Strasbourg, and, finally, in 1831, Professor Stoltz performed this operation for the first time in France, and with the most perfect success. Since then all doubts have gradually vanished, and most of the French accoucheurs have at length adopted a practice, which has now, for nearly a century, rendered such important services to humanity.*

* The French works on this subject are as yet quite few in number; but their authors, Burchardt, Dezeimeris, P. Dubois, Stoltz, Ferniot, and Lacour, have scrupulously examined the objections raised at various periods against the induction of a premature delivery, and they have endeavored to ascertain the precise indications for its performance; but neither of them has thought of imitating certain accoucheurs of neighboring countries, who make no scruple of trespassing on the domain of other obstetrical operations. They have attempted to prove that each of these operations has its own special indications, which cannot be substituted for any other; and hence, in our country, the induction of premature labour has always been governed by these rigorous data. For more full details the reader is referred to the cases, now nine in

Being once rid of the question of its morality, which for so long a period deterred some practitioners, who did not hesitate about the Cæsarean operation, or a mutilation of the child,* we have only to resolve, at the present day, the two following questions: In what cases is premature labour to be induced? And which is the best method of effecting this object?

ARTICLE I.

CASES REQUIRING A PREMATURE DELIVERY.

A. When summing up the indications presented by the pelvic deformities, it was stated that a premature labour might be brought on where the smallest diameter of the basin did not exceed three and three quarter inches, and where it was not less than two and a half inches; but we must now explain this proposition more fully.

It should be remembered that this operation is always resorted to for the double purpose of saving the child's life, and of preserving the mother from a danger which very frequently threatens her own existence. In other words, it is not to be attempted until the pregnancy is so far advanced that the viability of the foetus is fully established, and only in those cases where the contraction of the pelvis is such that a delivery at term is wholly impossible without performing either a bloody operation on the patient or mutilating her infant.

The French law, which has been constructed with a view of meeting all possible anomalies, has decided that the end of the sixth month is the period at which a foetus might be considered viable; but, laying aside some rare exceptions, which ought not to be brought in question, every practitioner well knows that the foetus seldom lives if born before the end of the seventh month. Consequently, we should not think of determining its premature expulsion before the full term of seven months. Although this point is easily decided so far as the interests of the new being are concerned, yet with regard to the mother such is not the case; for the mere assertion that this operation is to be performed whenever it is known that a natural delivery at term will be impossible, is altogether too vague and uncertain for a question of such importance; and therefore the two following points are to be established with the greatest possible precision, namely: 1st, the degree of retraction beyond which the pro-

number, practiced by the French accoucheurs. Five are reported by Professor Stoltz; one by Paul Dubois; one by Villeneuve, of Marseilles; one by Nichet, of Lyons; and the last, performed by myself, in the month of April of this present year. We merely allude to this interesting operation here, as it will shortly be published in detail in the *Annales de Chirurgie*.

* It is really wonderful that the consequences of this operation have been so long dreaded; since, in two hundred and fifty cases collected by M. Lacour, in the commencement of 1844, more than one-half of the children survived, and scarcely one woman in sixteen died. Let any one compare these results with those furnished either by symphysotomy or by the Cæsarean operation.

voked delivery is no longer practicable; and, 2d, within what limits its employment is justifiable.

As the operation is only admissible after the seventh month of gestation, we must of course ascertain what is the length of the head's various diameters at that period; because the extent of the bi-parietal diameter, which in most instances corresponds to the contracted one of the pelvis (the antero-posterior), will evidently show to what ultimate degree of pelvic retraction a delivery is still possible. Now, it appears from the researches of Dubois, of Stoltz, and Madame Lachapelle, that the bi-parietal diameter at the end of the seventh month averages from two and a half to two and three quarter inches, and therefore the smallest pelvic diameter must be two and three quarter inches at the least. This, then, is the extreme limit, beyond which the induction of premature delivery is no longer to be thought of.

But practitioners are not equally unanimous with regard to the highest limit. From the fact of the bi-parietal diameter being three and a half inches in a foetus at term, some have supposed that the labour ought to be induced whenever the least diameter of the basin does not equal this length; and making allowance for the reducibility of the head, they have fixed upon three and a quarter inches as the highest limit. No doubt, where the woman in a former pregnancy could only be delivered by a resort to embryotomy, the practitioner would clearly be warranted in provoking the labour, even though the sacro-pubic diameter was not less than three and a quarter inches; yet in primiparæ this would not be justifiable, for a spontaneous delivery is generally possible in them under such conditions.

On the whole, therefore, the induction of premature labour is only admissible when the smallest pelvic diameter measures at least two and a half inches. In multiparæ, where former experience has shown the necessity of a resort to embryotomy, it may be practiced as high as three and one-quarter inches, but in primiparæ never beyond three inches.

As regards the child, it is the more likely to live as its sojourn in the uterine cavity has been the more prolonged; and this proposition, the truth of which is universally acknowledged, should induce the operator to delay the induction of premature labour as long as possible. The degree of retraction, therefore, must guide us in selecting the most suitable period; but, in order to draw any positive conclusion from an examination of the pelvis, it is absolutely requisite to know the child's successive growth during every week that elapses between the end of the seventh month and the close of pregnancy. This has been determined approximatively by M. Stoltz, as follows:—

From the 32d to the 33d week, the bi-parietal diameter measures $2\frac{3}{4}$ inches.

From the 34th to the 35th week it measures $3\frac{1}{2}$ inches.

From the 36th to the 37th week it measures $3\frac{1}{4}$ inches.

Thus, if the labour were to be induced in consequence of a contraction to two and a half inches, it would be necessary to operate

at the end of the seventh month, making an allowance for the reducibility of the head, which at that period is quite considerable. But where it is clearly ascertained that the case under care is a twin-pregnancy, the operation might be put off for some time, or even abandoned altogether to nature, if the pelvic retraction be not very great: because, on the one hand, twins usually attain a less degree of development, and on the other, if born before term, their organization is generally too imperfect to admit of a healthy extra-uterine existence.

In treating of the various tumors that so often complicate pregnancy and parturition, Dr. Ashwell suggests a premature delivery as the most certain method of preventing those serious consequences, to which the patient is then exposed during the travail, or lying-in. But this opinion, in our estimation, is only admissible in the following cases:—

1st. When any voluminous tumor whatever exists in the belly and incommodes the enlargement of the womb; or is itself exposed to such a compression, as almost necessarily to lead to a consecutive inflammation.

2d. When a tumor developed in the excavation is so fixed and adherent to the pelvic walls that it can neither be pushed above the superior strait nor drawn down beyond the vulva; provided its bulk is sufficient to prevent the expulsion of a fetus at term.

Perhaps it would be proper here to give our opinion with regard to certain circumstances that have been started by some accoucheurs as contra-indications to the induction of labour; we allude to the influence of *first labours*, of twin pregnancies, and of mal-presentations.

Merriman has been the most prominent in urging a circumspection in the cases of primiparous females; but the fears on this head are evidently exaggerated, as numberless observations, among others the successful result quite recently obtained by M. Nichet, in the case of a rachitic patient who was pregnant for the first time, clearly prove. For myself, I would not hesitate to follow the example of Stoltz and Velpeau, and bring on the uterine contractions in a primipara, if I had fully ascertained the retraction of the pelvis. The obliteration of the cervix, which we all know remains closed almost till term, is certainly one difficulty the more to overcome in first pregnancies, but still this is not insurmountable.

In cases of twin pregnancy, Wenzel states that the induction of a premature delivery might be dispensed with, because the children are smaller than usual. This remark is certainly true, and might be advantageously followed, could the presence of twins be positively ascertained; which, however, is not an easy matter.

With regard to a mal-presentation of the foetus, were we to pay any attention to it, we should often lose the advantages of the operation, since this is an obstacle of very frequent occurrence. And as a delay of a few days only may compromise the success of the attempt, it would be better to change the presentation by external manipulations, as performed by Stoltz. When this measure proves

unsuccessful in modifying the presentation, we should equally endeavor to excite the uterine contraction, so as to perform the version as soon as the os uteri shall be sufficiently dilated.

B. The cases in which there is a retraction of the pelvis do not constitute the only ones in which the premature labour has been recommended. For the many serious diseases to which females are subject during the latter months of gestation are evidently connected with that condition; and a depletion of the womb is the best and often the only measure for removing them. This is also advised by some writers in certain affections that endanger the patient's life; among others, M. Ferniot has endeavored to prove, in a recent thesis, that under such circumstances the premature labour is quite as justifiable as in the pelvic retractions. The forced delivery was long since recommended in cases of profuse flooding, particularly in those dependent on the placenta's insertion over the os uteri; and the artificial rupture of the membranes, resorted to in our day, is merely another method of bringing on the uterine contractions. Further, many skillful physicians have not hesitated to provoke an accouchement where an attack of convulsions has resisted the ordinary remedies, or which, after being checked, returned every few days with a constantly increasing severity. And why should not the same course be pursued, where any serious disease, that existed before pregnancy, is so highly aggravated by this condition as to threaten an early termination in death, if its course be not speedily arrested by emptying the womb? In 1827, M. Costa submitted the question to the Academie de Médecine, whether or not it is proper to bring on the travail whenever the pregnancy is complicated by any disease that seriously threatens the mother's life, supposing the foetus is viable. We think the Academie erred in treating this proposition as *inexpedient*; for although Costa's question was too general, and it doubtless ought to have been better matured before making a final decision; yet restricted within certain limits, determined by observation, it already has received and will still receive numerous applications in practice. For instance, an aggravated disease of the heart, a general serous infiltration of the tissues, accompanied by effusions into the great cavities, a threatened suffocation, and the existence of a large aneurismal tumor, which is liable to be ruptured from the obstruction to the general circulation caused by the developed uterus, are certainly quite as dangerous as a flooding or an attack of convulsions; and a premature delivery appears to me advisable, after all the therapeutical resources usually resorted to in such cases have been tried without benefit.

A dropsy of the amnios, carried to an extreme degree, would also seem to be a sufficient indication for this measure. In fact, when the enlarged uterus fills the whole abdominal circuit, pushes up the diaphragm, and interferes with the respiration so much as to threaten suffocation, a puncture of the membranes, followed by the slow and gradual depletion of the womb, is evidently our sole resource. M. Duclos, of Toulouse, was fortunate enough to save a lady in this

way, in the year 1818, who was tottering on the brink of the grave.

The artificial delivery has likewise been recommended where the foetus is known to be dead, and in cases of retarded pregnancy. But, at this enlightened day, those imaginary accidents, attributed by Mai and Foderé to the death of the child in the womb, are no longer admitted in France; for with us it is customary to wait; because it is well known that the mother runs no danger, and that nature will eventually rid herself of the dead foetus without our intervention. The so-called dangers of a retarded pregnancy are equally illusory.

ARTICLE II.

OPERATIONS FOR THE INDUCTION OF PREMATURE LABOUR.

The methods proposed for effecting the child's premature expulsion are quite numerous; though, with reference to their mode of action, we may, like Professor Stoltz, divide them into two classes: including under the first all those which, by primarily influencing the general organization, have the secondary effect of exciting the uterine contractions; and, in the second, all those that operate directly and mechanically upon the womb, for the purpose of arousing its action.

The operation of the means appertaining to the first division is too uncertain to be relied upon in a case where it is necessary to act promptly and surely; and although tepid bathing, venesection, etc., have occasionally been followed by a premature delivery, yet no one would ever think of employing them with this view. Even the partisans of the ergot are few in number; for though its influence in rendering the slow and feeble contractions of the organ more energetic is undoubtedly, there is no positive evidence that it is capable of arousing them where none have previously existed; in a word, the spurred rye *renews* but does not *originate* the pains.

Wherefore, the accoucheur can only expect to bring on the uterine contractions with certainty, by resorting to those measures that act directly on the womb; these are: 1st. Frictions made over the fundus, and titillations of the os uteri; 2d. The detachment of the inferior segment of the ovum from the uterine wall; 3d. A perforation of the membranes; 4th. The introduction of a foreign body into the cervix; and, 5th. By plugging up the vagina.

The repeated frictions over the anterior part of the belly, and the fundus of the womb, originally recommended by Professor D'Outrepont, to which Ritgen added the direct excitation of the os uteri by one or more fingers introduced into the vagina, are now generally rejected. In truth, the irritation thereby produced is too feeble and transitory to bring on a genuine travail. The same remark applies to the plan proposed by Dr. Hamilton; which was to introduce the finger, or a gum-elastic catheter, beyond the internal orifice, and push it up as far as possible between the membranes and the internal

surface of the womb, so as to destroy their feeble adhesions. But, even supposing that it were always feasible to enter the finger, or a sound, in this manner above the internal orifice, it is not at all apparent how such a separation of the lower part of the ovum could prove sufficient to determine the expulsive pains; and it is highly probable that, in those cases where this plan appeared to answer, the success was rather owing to the irritation at the neck, caused by the introduction of a foreign body, than to the detachment itself.

A perforation of the membranes would naturally suggest itself as the most certain method of accomplishing the object; and this was the mode adopted by Macaulay in 1756, when he first put the recommendation of the most celebrated London physicians into practice. Most of the accoucheurs who have performed this operation since his day have likewise punctured the ovum; the various modifications suggested at different times merely refer to the shape, the length, or the curve of the instrument used, and scarcely merit a notice. For it must be evident that any canula whatever, that is sufficiently curved to correspond with the line of the pelvic axis, and is long enough to reach the os uteri without difficulty (that is, about eight to eight and a half inches), and furnished with a trocar, having its point concealed within, or only projecting a few lines beyond the end of the canula, will be all that is requisite. The only precautions to be observed, consist in guiding the instrument along in such a way as not to injure the mother's parts, and so as not to wound the foetus by the point of the trocar.

As elsewhere stated this is the most certain plan, because a discharge of the waters necessarily occasions a retraction of the uterine walls, and sooner or later a manifestation of the pains; we may further add that it is quite as easily accomplished, and is less painful to the mother than those about to be described; but we must acknowledge that the child's existence is much more endangered, because a partial or even a total escape of the amniotic liquid is not always followed at once by the occurrence of the first pains.

Sometimes forty or even sixty hours elapse before the uterus, irritated by the prolonged contact of the foetal irregularities, begins to contract; and even when the labour has actually commenced, the dilatation of the os uteri progresses very slowly, for at the seventh or eighth month the fibres in the neck have not as yet undergone those modifications which, at the ordinary term of gestation, render the dilatation more feasible; and thus a further period of twenty-four or thirty-six hours often passes away before the os uteri is sufficiently dilated. Now during all this time, the foetus, being no longer protected by the amniotic liquid, is subjected to the direct pressure of the contracted uterine walls; the umbilical cord might very easily be involved, and, from its compression, an interruption of the circulatory relations, which are indispensable to the support of the child's life would inevitably result; besides which, the placenta itself might be partially detached in consequence of the womb's retraction.

Many accoucheurs, influenced by these palpable dangers, had altogether rejected the perforation of the membranes, when a modifi-

cation was proposed by Meissner of Leipsic, which, fortunately, prevents the accidents just indicated, and, therefore, merits a further investigation into the propriety of puncturing the ovum. Various plans were suggested for moderating, as it were, the discharge of the amniotic liquid, and of only permitting the escape of a sufficient quantity of it to secure the induction of the pains; but no one had hitherto succeeded in accomplishing what Meissner has so happily effected. His process is as follows:—

Instead of puncturing the bag of waters at its lowest part, he perforates it high up close to the fundus of the womb, by using an instrument consisting of a canula and two stilets. The canula, which is made of silver, is nearly thirteen inches long, and about two lines in diameter; and it is curved so as to correspond to a segment of a circle which has a radius of eight inches. A ring is attached to it, near the lower extremity on the convex side, by which the instrument is managed, and which serves to indicate the direction of the curvature after the introduction. The two stilets (one being terminated above by an olive-shaped button, and the other by a trocar) are adapted to the canula; their lower end is flattened out so as to keep them from slipping in too far; the olive-shaped extremity of the first stilet ought not to project more than two or three lines beyond the canula; but the trocar point of the second should advance at least half an inch. The first stilet is intended to facilitate the introduction of the canula, and the second to make the puncture.

M. Meissner performs the operation in the following manner: The patient is placed in an erect posture, and the operator, stooping down on one knee before her, first ascertains the exact position of the cervix; if this is high up, and at the same time is directed so far backwards as scarcely to be reached, the patient will have to sit down on the edge of a chair, or else lie on a settee. The accoucheur then introduces the canula armed with the blunt stilet, along the palmar surface of the index finger into the cavity of the cervix, and presses it on until it has passed the internal orifice; of course, always having the convexity of the instrument directed towards the hollow of the sacrum. When the point of the canula has once got beyond the internal orifice, it is easily slipped up between the membranes and the uterine walls, to the extent of eight or ten inches above the os uteri. After having ascertained that the point of the instrument does not rest on any portion of the foetus, the accoucheur withdraws the olive-shaped stilet, and substitutes the trocar, with which he then punctures the membranes. The trocar is next withdrawn, a small quantity of liquid is allowed to escape through the canula, and then the latter itself is removed. After the operation is over, the woman may be permitted to sit down or walk about at pleasure. The waters gradually escape, thus lubricating and preparing the passages, and the pains become manifested in the course of twenty-four or forty-eight hours; and, in most cases, the dilatation is soon effected, the contractions are strong, and the labour is completed in thirty-six or forty-eight hours. Where the travail does not ad-

vance regularly, and the resistance from the retracted pelvis is very considerable, M. Meissner resorts to the measures usually employed under similar circumstances at term.

He has tried this mode of operating fourteen times, and he avers that both mother and child were saved in every instance; such a result, as compared with those obtained by other plans, certainly demands attention, and must encourage other practitioners to attempt it. Let us hope that the principals of large lying-in-hospitals will shortly confirm, by fresh success, the favorable accounts given by Meissner.

Dismayed by the dangers to which the child is exposed by the old plan of tapping the membranes, many obstetricians have suggested an induction of the uterine contractions, by introducing a foreign body into the neck of the womb, which is designed to act both as an irritant and as a mechanical dilator. Kluge may be considered as the author of this method of dilatation, and his process is the one still generally preferred. As well known, this is performed by introducing a conical piece of prepared sponge into the cervix uteri, and keeping it there by plugging up the vagina, until the pains are fully developed. The mode of operating is as follows:—

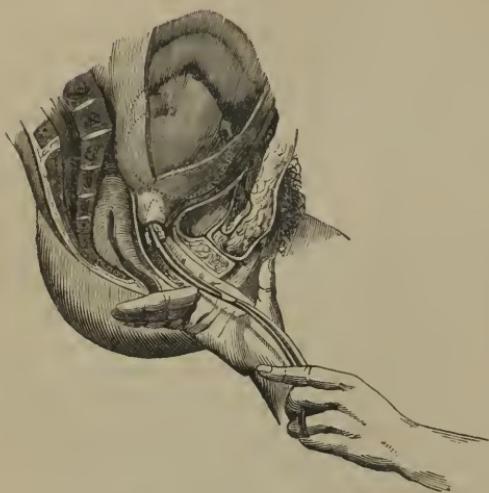
After having obtained the patient's consent, and, whenever possible, the advice of some professional brethren, the accoucheur has the woman prepared, by directing her to use the warm bath, and warm emollient and narcotic injections into the vagina, for a few days previous to the operation; before commencing, the bladder and rectum are to be emptied, and a fresh examination is to be made for the purpose of ascertaining the degree of the pelvic retraction, as well as the child's position.*

The female being placed in nearly the same position as if the forceps were to be applied, the operator first draws the cervix towards the median line, whenever it is found deviated; or, he might endeavor to get the neck within its uterine extremity, by introducing a speculum (Dubois). But this is not always practicable, especially if the part be directed a little forward; in general, the finger answers every purpose as a conductor; then a conical plug of prepared sponge, about two inches long, and half an inch in diameter at its base, and having a piece of tape ten inches long attached to it, is held by its large extremity, in a pair of long curved forceps, and is carried up towards the uterine orifice where it is gradually made to enter. After having sustained it there for five or six minutes, the forceps and speculum (if used) are withdrawn, and the vagina is next filled up with a large sponge, or bits of charpie, so as to keep the first sponge in its place; the whole is to be retained by a proper bandage, and the patient replaced in bed. The mode in which the foreign body acts

* Some obstetricians have laid down the formal precept that a premature delivery is only to be resorted to when the child's head presents. This is certainly a favorable condition, and desirable in all cases, but it ought not to be considered as a *sine qua non*, for, even should the pelvic version be necessary at the close of the travail, it would still be advisable to operate.

here, is obvious ; the prepared sponge, becoming saturated with the

Fig. 106.



Kluge's method of dilating the os uteri.

fluids from the neighboring parts, swells up, and irritates the cervix by its bulk ; this determines a dilatation of the latter, and the irritation thus caused, by reacting on the fibres of the uterus, often brings on the contractions in five or six hours. Should it happen that the pains are not fully established, or the dilatation of the os uteri is not completed in the course of twenty-four hours, the operation ought to be performed again, taking care this time to introduce a

larger piece of sponge (the first having been extracted by the tape) ; this second operation is nearly always successful. If, however, the labour pains be still too slow and feeble, local irritants, such as frictions over the abdomen, and titillations of the cervix, or still better the general stimulants, the ergot particularly, might be resorted to.

This process, which has now come into general use, has the great advantage of retaining the amniotic liquid nearly as long as in a natural labour at term ; its results, however, are far from being so satisfactory as those obtained by M. Meissner's plan, which certainly constitutes a sufficient reason for not persisting in its employment, in all cases, and for giving a trial to the modification proposed by the Leipsic accoucheur.

Quite recently, Dr. Scheller, of Berlin, has suggested a measure which is new as to its proposed object, though one of long standing in obstetrical science. Every practitioner is aware of the principal objection to the use of the tampon, so highly extolled by Leroux of Dijon, as a remedy for uterine hemorrhage ; now M. Scheller has conceived the idea of employing the irritation it produces as a mean for the induction of premature delivery ; for it is well known that its application is most generally followed by uterine contractions. He first made use of it in 1839, and was entirely successful ; since that time he has performed five similar operations, and the child was born living in four of them. The mode of operating, according to Stoltz's translation, is as follows (*Gaz. Méd. de Strasbourg*, Jan. 1843) :—

Before commencing, the bladder and rectum are to be emptied ; then several little rolls of charpie, steeped in oil, or smeared with some cerate, are successively pushed towards the upper part of the

vagina, the first of them having a piece of tape attached, to facilitate its subsequent extraction. Prepared sponge might be used for the same purpose, but it would then be requisite to retain it *in situ* by another common sponge. It is not necessary to fill the whole vagina; in fact, this would be attended with some inconvenience, for the excretion of the urine and fecal matters would be thereby impeded. It is advisable to introduce the tampon in the evening, when the patient is recumbent, because she will be more likely to remain quiet during the early periods of its operation.

The effects of this measure are shortly manifested by pains in the abdomen and loins, and by a feeling of tension in the womb itself; repeated frictions are then made over the fundus uteri, with a view of aiding its operation. As the tampon soon becomes saturated with the mucus from the vagina, and exhales a disagreeable odor, it ought to be renewed at least once in the course of the day, or even twice, if the sensibility of the parts permits; but, before introducing the second one, the vagina is washed out by an injection. As soon as the tampon has roused the uterine contractility, and the orifice dilates, it may be withdrawn; though, should the labour be lingering, and the contractions become slow and feeble, it must be re-applied, and ten grains of the secale cornutum be administered by the mouth every half hour. The pains may also be restored by dilating the orifice with the index finger, carefully avoiding a rupture of the membranes, until the dilatation is nearly completed.

The number of instances in which Schœller's process has been tried, is as yet too limited to warrant us in recommending it for general adoption. But the perusal of his cases has induced us to believe that the tampon will not always succeed; or, rather, we are satisfied of the slowness of its operation. For instance, in one of the five cases reported, it was first applied on the 23d of November, and the delivery did not take place until the 29th; in another, it was introduced on the 27th of January, and the labour was accomplished on the 5th of February. Besides which, as M. Stoltz observes, the abortive action of the tampon has only been noticed in those cases where the travail had already commenced, or where some marked disorder in the functions of the womb had occurred; but there is a vast difference between these latter and a woman whose uterine contractility still lies dormant.

Upon the whole, therefore, the dilatation by means of the prepared sponge, and the perforation of the membranes, still appear to be entitled to the preference. Kluge's plan has been sanctioned by a longer experience, but the modification suggested by Meissner, in the mode of puncturing the bag of waters, will make the balance lean toward his side, if the fortunate results hitherto obtained are confirmed by future success.

But whatever course be adopted, the labour itself exhibits nothing peculiar after the pains are once fully established. The delivery of the after-birth, notwithstanding what has been said to the contrary, is not any more difficult than in ordinary cases. Children born before term are, from the mere fact of a premature birth, more

feeble than others, and, therefore, require a more particular attention; they must be kept constantly surrounded by warm wadding, and, during the first few days at least, their nutriment ought to be less substantial than usual.*

CHAPTER V.

OF SYMPHYSEOTOMY.

THE relaxation of the pelvic symphyses, and the consequent separation of the articular surfaces, which often occur during pregnancy, have so long been known to the profession, that it is somewhat surprising the operation in question was not sooner suggested. It should be stated, however, that certain reflections, and even some facts well worthy of attention, are scattered here and there throughout the annals of our science. For instance, Severin Pineau, when

* As the reader has just learned, the induction of a premature delivery presupposes certain dimensions in the pelvic diameters. But where the retraction is such that the smallest diameter is less than two and a half inches, a question of the highest importance arises, namely, that of a forced delivery.

Supposing that the pelvis of a woman, who is in the third or fourth month of her pregnancy, is so narrow that it does not admit of the possibility of the expulsion or extraction of a viable foetus, is it proper to bring on an abortion? For a long time past I had been reflecting on this question (which in England has been decided in the affirmative), and had even collected several notes on the subject with a view of shortly announcing the result of my researches and reflections; but, during the past year, M. Paul Dubois has published an article in *La Gazette Médicale*, in which, without committing himself in a positive manner, the professor foreshadows the opinion that he will probably adopt in the next communication, to which this is only an introduction. Being placed at the head of the obstetrical school of France, and strong in the authority afforded by his previous labors, and his high position at *l'Academie de Médecine*, he is far better fitted than any other, for the dissemination of new and bold doctrines throughout our country. I confess that I have hitherto shrunk from the responsibility necessarily attached to such a proposition, and I am now proud to shelter my opinion behind that of my former teacher.

After a perusal of the two following chapters, it would not be difficult to divine my sentiments on this question. In the former edition of this work, among others will be found the following lines: "I have not spoken of the forced delivery, because this is an exceedingly delicate question, and its solution is altogether impossible in the present state of our science and legislation. The English authorities do not hesitate to teach, and a few French accoucheurs declare, that it should be resorted to whenever the dimensions of the pelvis are so contracted as to render the extraction of a viable infant impossible. I confess that, if I had to decide in so serious a matter, I should not hesitate to embrace this latter opinion, not conceiving how it is possible to waver about the destruction of a feeble embryo whose future existence is so uncertain, with a view of saving the mother from the hazardous chances of the Cesarean operation." (Edition of 1840.) I have nothing to alter in the above remark, made four years ago; excepting that, being sustained by the opinions of Professor Dubois, I do not now hesitate to lay down as a formal precept what was then timidly advanced in a note.

treating of the relaxation of the pelvic ligaments, quotes the text of Galen, and seems to anticipate the Sigaultian operation; since, in speaking of the pelvic articulations, he says: *Non tantum dilatare, sed etiam secari tuto possunt.* In a work published by Delacourvée, a French physician, in 1655, we find that, being summoned to a pregnant woman who died near full term, he divided the pubic symphysis with a razor, in order to extract the child more readily. In 1766, Plenck, under very similar circumstances, first performed the Cæsarean operation; but, being unable to extract the head, which was low down in the excavation, he divided the symphysis, and was successful in delivering the child. But this early attempt, instead of leading to the performance of this operation on the living female, seemed to have the opposite effect.

In fact, it was only towards the end of the last century (in 1768), that Sigault, then a student of medicine, suggested it to the Academy of Surgery, by whom it was rejected as a rash proposal. Not disconcerted by this reception, young Sigault supported his invention in a thesis at Angers in 1773; that is, five years after the presentation of his original memoir; and, finally, in 1777, he performed his first operation, assisted by Alphonse Leroy, who declared himself its zealous partisan. The mother and child were both saved; and on account of his success, Sigault, who had been almost reviled by the Academy of Surgery, was thenceforth covered with honors, and, regarded as a benefactor of humanity. The Faculty of Medicine at Paris even resolved to celebrate this wonderful discovery by having a medal struck in honor of its author. But, notwithstanding its early success soon gained him numerous followers, it also stirred up new and bitter adversaries; and the medical world was for a long time divided into two sets of enthusiasts, the *Symphyseans* and the *Cæsareans*; but, after their first ardor had abated, both parties finally settled down in a common opinion, as soon as they discovered that there had been exaggerations on each side. Since that time, the Cæsarean operation and symphyseotomy have been alike regarded as useful operations, applicable to certain particular cases; and, so far from attempting to exclude either, the more modern writers have rather endeavored to designate the conditions requiring their respective employment; which, indeed, would have been the wiser course at the time of its first discovery.

§ 1. EFFECTS OF SYMPHYSEOTOMY.

Supposing an opportunity for the section of the symphysis pubis were to offer, let us ascertain what advantages could be derived from it. From the best works published on this subject, it would appear that we cannot hope to gain more than four to six lines in the length of the antero-posterior diameters of the superior strait and excavation. After a division of the inter-pubic cartilage, the bones of the pubis separate spontaneously from four lines to an inch; which separation is produced by the retraction of the ligamentous fibres, known as the posterior sacro-iliac ligaments. While this is being effected, the coxal bone may be considered as a lever of the first

kind, having its long anterior arm bent near the middle; the centre of movement, or fulcrum, is found at the posterior part of the sacrum's articular surface. During the separation, the ligaments situated on the front part of the sacro-iliac articulation become tense and stretched, or even lacerated, when this is carried to a high degree; consequently, the amount of their resistance greatly influences the degree of separation. Again, if the accoucheur, by taking hold of the iliac crests, attempts to draw them asunder, he may considerably increase the interval already existing between the pubic bones; but it would be imprudent to carry this artificial removal too far; because, if continued beyond two inches, the anterior sacro-iliac ligaments would probably be ruptured, and the mother be subjected to very serious consecutive inflammations. The antero-posterior diameter of the strait is increased from two to three lines for every inch of separation between the pubes; and, since this interval may amount to two inches, four to five lines are therefore added to the length of the sacro-pubic diameter. In addition to which, the anterior parietal protuberance, by engaging in the space left between the pubic bones, diminishes the bi-parietal diameter to a corresponding extent; and it has been calculated that two to three lines are gained in this way; which would give a sum total in the increased length of the sacro-pubic diameter of six to eight lines.

But the sacro-pubic is not the only diameter augmented by symphyseotomy; for the oblique, and more particularly the transverse, ones are thereby greatly enlarged. In fact, the researches of Desgranges would seem to prove that the increase in the transverse direction, throughout the whole basin, amounts nearly to one-half of the separation at the pubis; and that the transverse enlargement of the pubic arch is almost equal to the whole of this interval. Whence it follows that the operation, which would only appear to be applicable to those cases where the contraction affects the sacro-pubic interval alone, is in reality equally advantageous when the transverse diameters of the excavation, or of the inferior strait, are retracted.

§ 2. INDICATIONS FOR SYMPHYSEOTOMY.

The results furnished by experiments made on the dead body, naturally lead to the conclusion that this operation is practicable in all those instances where five to eight lines, added to the contracted diameters, would prove sufficient to admit of a spontaneous delivery, or, at least, of an extraction of the foetus by the forceps. Such is the view adopted by most practitioners since the days of Sigault, and the extremes of the operation have been limited to two and a half inches for the lowest, and three and a quarter inches for the highest. But, at the present day, symphyseotomy is seldom resorted to, and it will be even less so hereafter, when accoucheurs generally shall have learned to appreciate the advantages derivable from the induction of a premature delivery.

The circumstances that have led to the performance of the Sigaultian operation, are equally strong in favor of the induction of

premature labour; and the results deduced from experience, the only impartial judge in such cases, have already decided in behalf of the latter operation. For, whenever a patient comes under care during the last two months of her pregnancy, whose pelvis ranges from two and a half to three inches in its smallest diameter, we ought to bring on the labour before term; more particularly if a mutilation of the foetus has been deemed necessary in a former confinement; and, on the other hand, we have elsewhere shown (page 475) that, whenever there is reason to believe that the child's life is more or less compromised by the previous duration of the labour, and the unsuccessful attempts resorted to for its extraction, the accoucheur should act as if it were really dead. Hence symphyseotomy should only be performed, even though the pelvis measures from two and a half to three inches in its smallest diameter, when the operator ascertains the existence of the deformity before the membranes are ruptured.

For, even admitting that it were not better to sacrifice the infant's life than to perform an operation which so often endangers the existence and commonly the health of the mother, is it always possible, in practice, to conform strictly with theoretical principles? The cases in which a similar degree of retraction has permitted the spontaneous expulsion of the foetus naturally suggest themselves to the mind; and although these exceptions to the rule are certainly rare, yet they may reoccur. Consequently, is it not prudent, before alarming the patient, to ascertain, by a proper delay, the inefficiency of the uterine efforts? Is not such a delay indispensable for proving the necessity of the operation? In most instances, would it not require several hours to induce the patient to yield to the entreaties of her family? Would the relatives themselves consent, before the lapse of time had convinced them of the absolute impossibility of a natural delivery? And would they not demand a trial of all other means, before a resort to such an extreme measure? Could the accoucheur object to an application of the forceps, which has so many times, under like circumstances, been followed with success? Or could he refuse, had he, like ourselves, seen a living foetus expelled at term through a pelvis whose antero-posterior diameter measured but three inches? These uncertainties, hesitations, and forced delays, which a firm and resolute physician having charge of a hospital may escape, are inevitable in private practice; where we have the fears of the family, the resistance on the part of the patient herself, and oftentimes the anxiety caused by the jealousy of some of our own brethren, to contend with; during all which, time runs away, the labour is progressing, the membranes are ruptured, and the favorable chances for performing the operation are lost. It will be said *perhaps* the slowness of the labour is more dependent on the feeble contractions than on the disproportion between the diameters of the head and those of the pelvis; or, *perhaps* a little artificial aid joined to the powers of nature will succeed in accomplishing her work. But while thus wavering from hope to hope, from *perhaps* to *perhaps*, the travail arrives at that stage where we begin to doubt

the viability of the foetus; and, when such a doubt arises, can we any longer think of resorting to symphyseotomy?

This operation has been proposed in other cases, besides those dependent on a retraction of the pelvis; as, for instance, for tumors in the excavation, or for a very large head, or a retroversion of the womb, occurring during the early months of gestation. Thus, it was resorted to by Duret, in order to overcome an obstacle to the head's engagement, created by the development of an exostosis, about the size of a nut, on the first false vertebra; as also in the following case, published by Doctor Damman, in Casper's journal: A woman had been three days in labour, but the head was so voluminous that it could not engage in the excavation, notwithstanding the perfect conformation of the pelvis; and, having become wedged in the superior strait, an application of the forceps was impossible. Although the long duration of the travail ought naturally to have created some doubt with regard to the child's condition, yet M. Damman resorted to symphyseotomy; the infant was born dead, but he was fortunate enough to save the mother.

The remarks before made with regard to this operation in cases of deformed pelvis, equally apply to those where a tumor is found in the excavation, and those where the excessive size of the child's head constitutes the only obstacle to a spontaneous delivery. As to its utility or disadvantages when resorted to for the purpose of facilitating the reduction and correction of a retroverted uterus, experience is still wanting.

In our estimate of the indications for this operation, we cannot conform, as the reader will see, to the rules laid down by its partisans; because, so far from being precise and positive, as they suppose, these rules only leave the practitioner in doubt and uncertainty. Laying aside for a moment all theoretical discussions, and looking at the question only in its practical point of view, we are led almost irresistibly to the conclusion that, in the present state of our science, symphysotomy is no longer practicable. For, independently of the difficulties in determining its indications precisely, it must not be supposed that the operation is attended with as little danger as Sigault and Alphonse Leroy endeavored to prove; and we only need refer to the numerous accidents thereby produced to sustain the justice of our conclusions. In fact, these dangers are so great that, according to Baudelocque, of forty-one females operated upon, fourteen died, and thirteen children only were born living! Not to allude to the numberless infirmities that embittered the existence of nearly all the patients who survived the operation.

Operation.—This is very simple, namely; the woman, being placed in the same position as if the forceps were to be applied, is properly supported by assistants; the bladder is emptied, and the catheter left in the urethra for the purpose of protecting this canal from the edge of the knife, by pressing it towards the right side. The operator depresses the skin covering the pubis, so as to find the precise spot for cutting down on the symphysis. This being done, an assistant stretches the skin upward as much as possible, and the

surgeon then makes an incision through the soft parts, commencing about half an inch above the symphysis, and prolonging it downwards over the centre of the articulation, nearly to the clitoris, and terminating a little to the left; the inter-pubic ligament is then carefully incised, and, when it is nearly cut through, great precaution is requisite not to wound the bladder. As soon as the section is effected, a separation of the pubes follows; when, if the patient's strength is not exhausted, and the uterine pains are still strong and frequent, the further delivery is abandoned to nature; but in the opposite case the forceps is applied, or the labour is terminated by the pelvic version and by tractions on the lower extremities. After the delivery is completed, the patient is cleansed, and the vessels tied, if any were divided; the pubic bones are drawn together, and the lips of the wound sustained by adhesive strips, charpie, and a compress, and the whole retained *in situ* by a bandage around the body. The symptoms subsequently manifested are to be carefully combated as they arise. The perfect consolidation of the symphysis is seldom completed under three or four months, even in the most favorable cases, and instances have been known where this never occurred, though the patients were ultimately enabled to walk, by the formation of a cellulo-fibrous tissue; which, says Alphonse Leroy, by filling up the space in the symphysis, restores the solidity of the articulation.

This process is the one generally followed; but numerous modifications of it have been suggested, most of which are intended for the better protection of the urethra; though none of them, however, are of much value. Attributing the consequences that follow in the train of symphyseotomy to the exposure of the articular surfaces and the lips of the womb to the external air, M. Imbert, of Lyons, has proposed the division of the inter-pubic cartilage, without involving the skin. This procedure is feasible enough; but, in our estimation, it can only obviate the smallest part of the consecutive accidents; for the various dangers to which the patient is then exposed are far less dependent on an inflammation of the pubic symphysis than on the disorders created by the separation of the sacro-iliac articulations.

These remarks apply with equal force to the division of the pubis, which Professor Stoltz advises to be performed by the sub-cutaneous method. But, after the opinion I have advanced with regard to the operation itself, it seems unnecessary to dilate on the different ways of performing it; I must, however, describe that of the Strasbourg professor, for, although a sufficient lapse of time has not decided on its relative merits, yet it seems to offer the most favorable chances.

It consists in the division of one of the pubic bones near the symphysis, by means of a chain-saw, without incising the integuments. The skin having been previously shaved, a small opening is made on the mons veneris at the point corresponding with the crest of the pubis, either on the right or left side of the symphysis; a long and slightly curved needle, having the saw attached, is then entered at

this opening, and slipped along the inner face of the pubis, grazing the bone, and its point is brought out at the side of the clitoris, between the cavernous body and the descending branch of the pubis from which the latter arises. The handle is next fitted on, and, taking the saw by both extremities, it is moderately stretched between the two hands, and the pubis is cut through by a few strokes. The divided portions of the bone immediately separate, and this separation can be increased almost at will, or it may be effected by the direct pressure of the child's head or trunk. The pubis being divided, one of the handles is removed, and the instrument is withdrawn; and the small opening which is left behind heals up without difficulty.

But I repeat, that the modifications suggested by Stoltz and Imbert still require the sanction of a more extended experience.

CHAPTER VI.

OF THE CÆSAREAN OPERATION.

HYSEROTOMY, or the Cæsarean operation, consists of an incision through the abdominal and uterine walls, for the purpose of extracting the child.

This section had been recommended in cases where a pregnant woman died undelivered, long before it was resorted to on the living female; and it can readily be traced back to remote sources worthy of credit, without confounding it with the mysteries of the poets, or with the marvels of antiquity. For instance, Valerius Maximus speaks of the posthumous birth of the philosopher Gorgias; and Pliny states that the celebrated Scipio Africanus and Manilius were saved under Numa's law, which interdicted the interment of a woman, big with child, until her belly was opened. This wise and prudent law was received and adopted throughout Christendom, and it still flourishes vigorously in the Roman church.

The precise period at which the operation was first performed on the living patient remains undetermined. Mansfeld, of Brunswick, endeavored to deduce indubitable traces of it from the Talmud; but one of his cotemporaries has wholly refuted such an opinion. According to M. C. Lage, the first authentic case was reported by Nicolas de Falcon, in 1491; J. Nufer performed it in 1500, as detailed by Gaspar Bauhin; and F. Rousset published a work in 1581, which has since acquired considerable celebrity from the great number of cases it contains, all of which were successful.

The surgeons were so emboldened by Rousset's monograph, that the Cæsarean operation was often resorted to without any indication whatever, and its popularity became so great at one time that a cotemporary Dominican friar, Scipio Merunia, affirms that it was

as common in France as blood-letting in Italy. However, a reaction soon took place; for Guillemeau, Paré, Viard, and some other prominent surgeons having failed in their attempts, Marchant succeeded in stirring up his countrymen against Rousset, by founding some virulent attacks on these reverses; and the Cæsarean section would have fallen into oblivion, if Gaspard Bauhin had not come to its aid with fresh proofs in its favor.

The interesting and delicate question of hysterotomy was again contested during the whole of the seventeenth century, and then, as in the preceding one, its advantages and disadvantages were grossly exaggerated; so that the following century arrived without any clear idea having been formed respecting the operation or its value, owing to the total want of probity and justice in the examination of the facts of the case. In 1749, Simon read a remarkable memoir on this subject before the Royal Academy of Surgery; but it is characterized by credulity and an absence of the fear of criticism. Since that period, most of the works on the Cæsarean operation have merely discussed the indications for its performance; but not one of them, unless it is Sacombe's passionate and scandalous dissertation, has attempted to prove the impossibility of its successful result. Although the favorable cases are not very numerous, yet there are a few that may clearly be considered as incontestable. In our day, the field for the Cæsarean, as well as for all other obstetrical operations, is limited; but this is rather to be attributed to the advance of science, and to the eminently practical spirit of the present age.

This operation may be practiced on the living female, whenever the natural passages through which the child has to pass are so narrow, or so obstructed, that a delivery by the application of the forceps, or by symphyseotomy, is wholly impossible; and when the mutilation of the child itself would not permit its extraction without exposing the mother to the greatest dangers. It may likewise be resorted to for the purpose of saving the infant when the patient dies in the advanced stages of gestation.

Whenever a physician is summoned to a pregnant woman soon after her death, he ought to perform it, after having carefully ascertained that the death is real; because, the child's decease does not always precede that of the mother, and numerous instances are recorded where living children have been extracted ten or fifteen minutes, and even half an hour, after the woman died. Although the operation will generally prove ineffectual after the lapse of a longer period, still it ought to be tried; since some few cases, whose authenticity I do not vouch for, would seem to prove that the foetus has continued to live in the womb during ten, fifteen, and even twenty-four hours!

We can only expect to extract a living infant after the seventh month; nevertheless, the desire of the relatives in Catholic families to have the child baptized, often constrains the medical attendant to open the patient, even where she died before the sixth month of gestation. The incision through the abdominal and uterine walls,

under such circumstances, should be made with the same precautions as during life; because, the necessity of acting as promptly as possible, may not afford the operator a sufficient length of time to ascertain that the death is real. Should the female die during the parturition, he ought to examine the condition of the genital organs immediately; for, notwithstanding the fact that the labour may have but recently commenced, these parts, from their diminished resistance after death, may occasionally permit the delivery of the foetus to be effected by the version or the forceps. In fact, this latter operation would be positively indicated if the child's head were low down in the excavation; because, in such cases, its extraction by the Cæsarean section would be rendered extremely difficult, if not impossible; for numerous recorded instances have fully tested the inefficiency of tractions made on the foetal trunk through the abdominal incision.

When practiced on the living female, the Cæsarean section constitutes one of the most serious operations in surgery; for four-fifths of its unfortunate victims have perished. This result, which would probably be still more unfavorable if the same pains had been taken to bring before the public the unsuccessful, as have been used to circulate the more fortunate cases, might truly deter the surgeon from resorting to such an operation.

All accoucheurs agree in the opinion that, where the smallest diameter of the pelvis does not amount to two and a half inches, a delivery by the natural passages is absolutely impossible; and that we have then only to choose between hysterotomy and a mutilation of the foetus. Now, with a view of explaining more clearly the indications presented by this degree of retraction, we shall adopt the subdivision made by M. Paul Dubois; that is, into pelvises presenting at least two and one-eighth inches in the smallest diameter, and into those below that point.

Supposing the smallest diameter measures two and one-eighth inches, and it has been positively determined that the child is still alive (for the question is no longer doubtful when there is the least uncertainty on this point), two different measures are presented for our serious consideration; namely, embryotomy and the Cæsarean operation. All the French accoucheurs, including Dubois himself, are in favor of the latter, for he says, "the Cæsarean operation is our only resource, and, therefore, it must be resorted to." (*These, p. 71.*)

We are not ignorant of the importance of this question; and it requires a settled and positive conviction, on our part, to warrant us in deciding it differently from other French authors; but we are sustained by the almost unanimous opinion of the English practitioners, who believe that the child ought to be sacrificed whenever the delivery can be effected by embryotomy. Four years ago, we strongly expressed a desire (in the first edition of this work, page 766) to see the views of our neighbors more generally disseminated in France in the following words: "And, as to ourselves, our voice will be against the Cæsarean operation in all cases where it is not

absolutely indispensable to the mother's safety." And we do not hesitate now to advance the same doctrine. In fact, it cannot be forgotten that this operation is nearly always fatal to the female, even admitting that the statistical tables exhibit the exact truth. For instance, laying aside the details contributed by the surgeons of Great Britain, who are charged with the non-performance of the operation at the opportune moment, and supposing that the unsuccessful cases have been as honestly reported as the successful ones, an impartial examination of all the facts leads to the melancholy conclusion, that nearly four-fifths of the mothers have perished (according to Keyser, the precise ratio of mortality is seventy-nine per cent). The question then recurs, does this frightful operation save the child? Or is it at all certain that we can present to the mother, as a compensation for all her sufferings, something more than a lifeless corpse? Unfortunately, this is not the case, and the partisans of the Cæsarean section are constrained to acknowledge that they are not always fortunate enough to extract a living child, even when the operation is performed at the time of their own selection. But admitting for a moment that, if resorted to immediately after the membranes are ruptured, the section will always save the child, still this, in my opinion, does not compensate for the dangers to the mother.

You confess that more than one-half of the females die, but can you aver that more than a moiety of the children you save by gastrotomy will live long enough to dry the tears shed over their birth? Read the tables hitherto published on the average of human life, and then tell me whether fifty, out of a hundred living infants, attain their thirtieth year. Wherefore, it is not only the immediate effect of gastrotomy, but also its remote consequences that are to be taken into consideration. This at least is certain, that you sacrifice more than a moiety of the women immediately; and, even supposing that every child was alive at the time of its birth, the experience of ages has proved, that you will not find one-half of them attain the age at which their mothers died.

The advantage is, therefore, in favor of embryotomy, when considered with regard to the mere question of figures. But the feeble and uncertain life of an infant, who is only connected with the external world through its mother, who as yet has neither thought nor affection, hope nor fear, can it be compared to that of a young woman associated with those around her by a thousand social and religious ties? Or will the survival of this poor child fill up the void left by the death of its mother? And, lastly, can society at large ever receive from a new-born infant the duties it had a right to expect from the adult woman? Hence, family ties and social interests all militate in favor of the mother.

In a political, if not in a moral point of view, we are clearly justified, says Ramsbotham, in preferring the strong to the feeble, the sound man to a diseased one, and, consequently, the mother of a family to the still unborn infant, whenever we are placed under the cruel necessity of sacrificing the one or the other. One more argu-

ment yet remains in favor of the view I adopt—the most ancient of all the principles of morality, the foundation of all medical law—is, that we should treat our patients as we would treat ourselves or our dearest relatives; now, where is the physician who, if forced to decide under such circumstances between the life of his wife and that of the child she still bears in her womb, would hesitate to authorize the sacrifice of the latter?

We are therefore justified in the conclusion that, whenever the pelvis exhibits but two inches and one-eighth in its smallest diameter, embryotomy ought to be resorted to.

But, unhappily, the Cæsarean operation is the only practicable resource when the smallest diameter of the pelvis does not exceed two inches; for the extraction of a mutilated foetus is then so slow, difficult, and painful that, while necessarily killing the child, the danger to the mother is as great as from the performance of hysterotomy.

Supposing the necessity for the operation has been fully determined, numerous important questions arise for consideration, namely: what is the most favorable stage of the labour for its performance? Has the previous duration of the travail any positive influence over the result? And is it better to operate before or after the membranes are ruptured? An answer to all these questions will be found in the careful examination of the published cases.

<i>A. Duration of the Travail.</i> —The whole duration of the labour					
has been noted in one hundred and sixty-four cases; in sixty-two of which the woman recovered, and in one hundred and two she was lost. With a view of showing the influence of duration as regards the mother, we divide these cases into three classes, namely:					
Where the operation was performed after the travail had lasted twenty-four hours, there were 20 successful and 40 unsuccessful cases,					
From 25 to 72 " " 34 " 41 "					
More than 72 " " 8 " 21 "					
—			—		
62			102		

From this table, which is taken from Keyser's excellent work, we may conclude that the duration of the labour would only appear to have an unfavorable influence when it has continued beyond seventy-two hours.

But the same remark does not apply to the child; for, taking the same one hundred and sixty-four cases, in a hundred and fifty-eight of which the infant's condition is reported, we find that fifty-seven were stillborn, and a hundred and one survived; and, adopting the same division we have:—

After a duration of 24 hours, 42 successful and 16 unsuccessful cases.

From	25 to 72	"	48	"	24	"	"
More than	72	"	11	"	17	"	"
—			—			—	
			101			57	

Whence it follows that the chances are less for a living child as the labour is the more prolonged.

B. *Rupture of the Membranes.*—The time that elapsed after the membranes were ruptured has been stated in one hundred and twelve cases. We shall likewise classify these under three heads, according to whether the operation was performed:—

	Cases.	As regards the mother.	
		Successful.	Unsuccessful.
1st. Before or within six hours after the membranes were ruptured	= 39	20	19
2d. From seven to twenty-four hours after the rupture	= 35	14	21
3d. More than twenty-four hours after the rupture	= 38	13	25
	— 112	— 47	— 65

From which it appears that the operation is so much the more unfavorable for the mother as a greater time has elapsed after the rupture of the membranes.

The fate of the child is only known in one hundred and six cases; still using the same classification, we have:—

	Cases.	Successful.	Stillborn.
1st. Before or within six hours after the rupture	= 37	34	3
2d. From seven to twenty-four hours after the rupture	= 32	25	7
3d. More than twenty-four hours after the rupture	= 37	19	18
	— 106	— 78	— 28

c. It is unnecessary to add that, with regard to the foetus, the prognosis is much more unfavorable when an artificial extraction has been attempted before resorting to the Cæsarean section. Indeed, it must be evident, from the foregoing facts, that the most favorable time for operating is either before or immediately after the rupture of the membranes.

Whenever we have an opportunity of attending the patient during the last few days of her pregnancy, it is advisable to prepare her for the operation by a suitable regimen, such as tepid bathing, moderate sanguineous emissions, etc. But where the labour has actually commenced, the operation is to be proceeded with as soon as the os uteri is sufficiently dilated to permit the subsequent discharge of the lochia. It has been recommended to puncture the membranes, lest the waters be effused into the peritoneal cavity; but as this accident can very easily be prevented, and as the distension of the womb is favorable to the retraction of the organ after the operation, this ought not to be done. Just before commencing, the bladder and rectum are to be emptied. Two bistouries, the one curved, the other

having a straight probe-pointed blade, forceps, ligatures, cold and tepid water, a little vinegar, sponges, needles armed with thready, quill-barrels, strips of adhesive plaster, some charpie, and compresses, and a bandage for the body, constitute the necessary apparatus.

The patient is then laid on a bed of the proper height, and is held quiet by the attendants; an intelligent assistant is charged with the duty of keeping the womb on the median line by placing his hands over it; and another presses one hand over the fundus uteri with a view of keeping up the intestines, which are apt to become insinuated between the uterine and the abdominal walls. The surgeon then makes an incision along the median line, through the skin and subcutaneous fatty tissue, extending from a little below the umbilicus, downwards to within an inch and a half or two inches of the pubis; this incision ought to be at least five or six inches long, and provided this extent is not obtained within the indicated points, in consequence of the woman's low stature, it should be prolonged a little upwards and to the left of the umbilicus. The operator next divides the aponeurotic fibres of the linea alba, layer by layer, and thus gets to the peritoneum, into which he then makes a small opening; having inserted the index finger of the left hand into this, he directs the probe-pointed bistoury along its palmar face and enlarges the incision. The proper tissue of the uterus is now carefully incised, layer by layer, until the surface of the membranes or the placenta is brought into view; the bag of waters is then opened by a simple puncture, and the probe-pointed bistoury is entered at this orifice, and the incision enlarged to the extent of five or six inches, directing it rather toward the superior than the inferior angle of the external wound. The assistant, who is charged with the duty of keeping the lips of the wound apart, must be very careful to hold the abdominal and uterine walls in contact with each other at the time when the membranes are ruptured. The extraction of the foetus is afterwards accomplished by seizing hold of the first extremity that presents. The uterus retracts immediately and effects the detachment of the placenta, which is pushed towards the wound: it is then extracted together with the membranes, which have been carefully twisted into a cord. If any blood has escaped into the uterine cavity, it is removed, as well as any other foreign body that may obstruct the cervix.

The wound in the uterus requires no other attention than that of being well cleansed. The lips of the one made through the abdominal walls are brought together at two or three points by the twisted suture, taking care to leave a free space towards its inferior part for the discharge of the fluids that escape into the abdomen; strips of adhesive plaster are used between the points of the suture, over which the uniting bandage is then applied; the wound is next covered with charpie smeared with cerate, and common compresses, and the whole retained *in situ* by a moderately drawn body-bandage. The subsequent treatment is restricted to combating the inflammatory and other symptoms as they may arise.

Vaginal Cesarean Operation.—This name is applied to the in-

cisions which are sometimes made on the neck or other portion of the uterus that projects into the vagina. It may be resorted to in those cases of a partial obliteration of the cervix, where a scirrhous, or carcinomatous, degeneration of the lips prevents its dilatation; or even when any accident occurs that requires a prompt delivery and the os uteri is not sufficiently dilated. This therefore is a mere division of the neck, having no resemblance whatever to the Cæsarean operation properly so called.

But in some instances no opening at all is to be found, and then the uterine wall has to be divided for the purpose of creating an artificial passage for the child. This latter operation has been practiced a number of times by different persons, among others by my friend Dr. Caffe, in 1833, with entire success. The mode of performing it is very simple: a sharp-pointed bistoury is carefully guided up along the left forefinger directly upon the anterior-inferior portion of the uterine wall which it incises; but the instrument must not be pushed in too deep, lest the presenting part of the child be wounded; and equal care is requisite to avoid prolonging the incision too far, either forwards or backwards, for fear of injuring the bladder or rectum. Of course, the lateral incisions are much less dangerous. A crucial form is the best one for the opening, and, the latter being effected, the further delivery is generally abandoned to nature.

CHAPTER VII.

OF EMBRYOTOMY.

THIS name is applied to the operation by which the child's parts are so reduced as to admit of their successive extraction, when it is impossible to terminate the delivery in any other way. In some cases, it consists of simple punctures or incisions made on the head, chest, or abdomen, with a view of diminishing its size, while in others the infant's body is divided into several parts.

It was elsewhere stated that, whenever a considerable quantity of water had accumulated in the head, chest, or belly, the fluid could easily be evacuated by a simple puncture with any straight bistoury, or still better by a trocar; and therefore we need not recur to the same subject. (*Vide Hydrocephalus.*)

Embryotomy is indicated whenever there is any insurmountable obstacle to the child's spontaneous expulsion, and where an application of the forceps proves insufficient to effect the delivery; always supposing that the foetus is dead, or there are good reasons for believing that its viability is destroyed by the forced length of the travail. This operation is resorted to in England much oftener than in France; for most of the accoucheurs of that country pro-

scribe the Cæsarean section and symphyseotomy, except in cases of absolute necessity, but they do not hesitate to mutilate the infant, even when it is still living; and the reader will see, from the foregoing chapters, that we fully embrace the same opinion.

Of course, when the pelvis is thus retracted, the child may present either by its pelvic or its cephalic extremity, or by some intermediate portion of the body, at the superior strait: and therefore we have to describe the operation resorted to in these different cases.

A. *Presentation of the Head.*—Embryotomy having been decided upon, the surgeon should proceed to the operation as early as possible, with a view of sparing the patient the useless and often dangerous exertions she is liable to make.

The artificial diminution of the head is compounded of several successive operations, the whole of which constitute *craniotomy*, or *cephalotomy*; these are, the perforation of the cranium, the removal of the cerebral matters, and the crushing of the base of the skull. Numerous instruments have been devised for each of these purposes, but we shall only enumerate those which appear preferable.

Fig. 107.



Fig. 107. Smellie's scissors closed.
Fig. 108. The same opened.

Fig. 108.

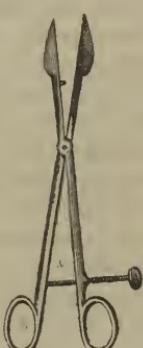


Fig. 109.



Mode of introducing and using Smellie's scissors.

Craniotomy.—The perforation of the cranium can be accomplished by a straight, sharp-pointed bistoury; but the best instrument by far for this purpose is *Smellie's scissors*,

which is very strong, and has its cutting edges externally; and, from being terminated by a sharp point, it is admirably calculated for penetrating through the osseous vault; when, by opening the handles, the original orifice is easily enlarged. The patient being placed in a proper position, the instrument is held in the right hand, and its point, covered by a little pellet of wax, is carefully guided along the palmar surface of the left one, previously introduced into the

vagina (*vide* Fig. 109) directly upon the head, on a fontanelle, or suture, if possible; but if, as generally happens, this is not feasible, the point of the scissors is applied against one of the cranial bones, being careful to place it perpendicularly on the part, to prevent its slipping; the instrument is then rotated in opposite directions, until the want of resistance shows that it has entered the osseous vault. The opening is next enlarged, either by pressing the handles of the scissors apart, or, if deemed more advisable, by making a second incision at right angles to the first. The instrument is now pushed deeper, and rotated, so as to break up the cerebral mass; this is next washed out, and the cranium is emptied by means of a syringe having a long canula attached, which is passed through the opening. But such injections are generally superfluous when the embryotomy forceps is to be used, for the pressure made by it is quite sufficient to produce the evacuation.

If the woman is not much exhausted, and the pelvic retraction is not such as to preclude the passage of the base of the skull, the operation might be suspended for a time, and the subsequent delivery be left to the powers of nature; but, under other circumstances, the common forceps, or even the embryotomy forceps, where the narrowed pelvis is less than three inches, ought to be applied.

This latter instrument is advantageously substituted for the serrated pincers, the sharp crotchets, and all the other murderous implements that were formerly used in these difficult cases. The honor of its invention, notwithstanding several rival claims, is due to M. A. Baudelocque, a relative of the celebrated accoucheur of that name. It is composed of two long branches, the blades of which are devoid of fenestra, and, besides, they are far less curved than those of the ordinary forceps, so that, when closed, they can pass through a diameter not exceeding two inches. The two branches articulate with each other near the middle, and, when they are joined, the blades can be tightened at pleasure, by means of a screw passing through the ends of the handles, and worked by a powerful lever.

Even as it is now constructed, Baudelocque's embryotomy forceps is certainly a very useful instrument; but, as I have elsewhere proved (*Revue Médicale*, May, 1843), it presents some disadvantages, which render its application difficult and often even dangerous. For instance: 1. It is too straight to accommodate itself to the curvature of the pelvis, and it is therefore applied with difficulty to the sides of the head; 2. As the clamps are nearly plane, they open like a pair of scissors, and do not encase the head, as the concave blades of the ordinary forceps do; consequently, they are liable to slip, and thus give rise to serious accidents; 3. Its tractions are very often ineffectual, even when well applied to the head; because it necessarily draws in a direction different from the axis of the superior strait, owing to the absence of curvature in the edges of its blades.

As the difficulties and dangers attending its use are not imaginary, I have endeavored to prevent them, by suggesting a modification in

the embryotomy forceps generally employed, although well convinced that the failure of an operation is very frequently more dependent on the operator himself than on his instrument. With this view, I had an instrument made by M. Charrière, which differs in two important particulars from those hitherto constructed, and which seems to obviate the various disadvantages I have just enumerated.

We stated above that the absence of curvature in the edges interfered very seriously with the seizure of the head, which is found more anteriorly than in well-formed basins, both in consequence of the pelvic retraction and its own elevation; hence, we have given a curvature to our forceps slightly exceeding that of Levret's. This, however, did not require a great effort of the imagination, for we have only impressed the same modification on the embryotomy forceps that Smellie and Levret long since gave to the one invented by the Chamberlens. This curvature is intended to fulfil the indication of accommodating the shape of the instrument to that of the curved canal it has to traverse.

The slipping of the head during the tractions is principally owing to the fact, as averred above, that the blades, from being nearly plane on their internal surface, do not properly embrace this part, and that, opening like a pair of scissors, their widest separation is found at the points. Here the difficulty was considerably greater, because the internal surface of the clamps could not be hollowed out without greatly increasing the interval at their middle part, and, consequently, without rendering the instrument non-applicable in a

Fig. 110.

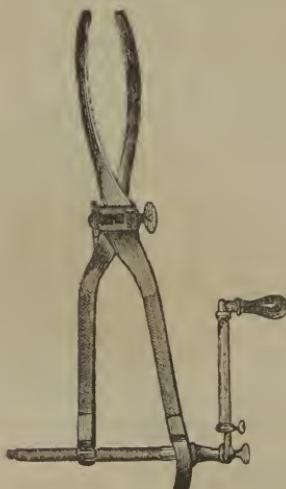
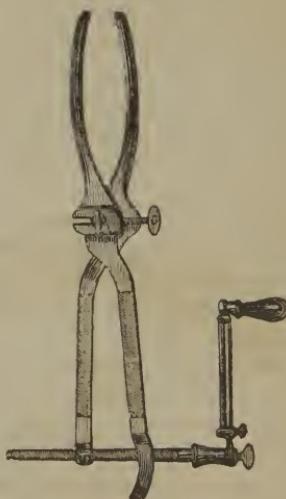


Fig. 111.



The embryotomy or cephalotribe forceps.

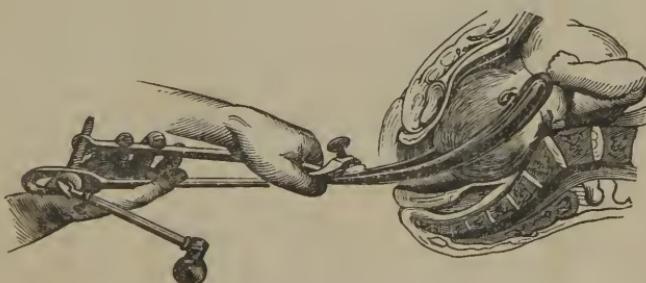
A comparison of these two figures will furnish an idea of the amount of separation obtained at the base of the blades (Fig. 111), by means of the regulating screw.

host of cases where Baudelocque's might be successfully used. After mature reflection, we propose the following as its second and most

important modification: namely, to make a much wider entablature at the joint; while, in other respects, the length and width of our forceps correspond with Baudelocque's. This increased width at the articular part permits the base of the blades to be removed from each other laterally by means of a regulating screw, that can be turned at will; the point of which, by working on the pivot, will permit a greater separation at the base than at the points of the blades. Hence, it is evident that when the head is once embraced by the instrument it cannot slip from the extremity of the clamps during the tractions, because the interval is much less here than at the base or even than at their middle part. In a word, the embryotomy forceps hitherto employed resembles a cone when half opened, the base of which is at the points of the blades, and the apex at the articulation; but ours, on the contrary, may, under the same conditions, be compared to a cone having its base at the articular part, and its summit at the extremity of the blades. M. Baudelocque has erred in endeavoring to extend the employment of the embryotomy or cephalotribe forceps beyond its sphere. However, when restricted within proper limits, it certainly constitutes one of the most useful instruments in obstetric surgery; for experience has already shown that it may render invaluable service whenever the smallest diameter of the strait amounts to two inches; but, less than that, it cannot reduce the size of the head sufficiently to enable it to pass through the contracted part. Hence (as already stated, when treating of the indications presented by the pelvic deformities) the Cæsarean operation is our only resource where the retracted strait does not amount to two inches.

The application of the cephalotribe is regulated by the same rules as that of the ordinary forceps, being always introduced on the sides

Fig. 112.



The embryotomy forceps applied and locked.

of the pelvis. The greatest precaution is requisite to ascertain positively that the instrument has really entered the uterine cavity, and that none of the mother's parts are pinched by its clamps.

After the blades are articulated, a strong pressure is made on the head by means of the winch attached to the end of the handles; and, when the reduction is supposed to be sufficient, the operator

takes hold of the instrument with both hands, and endeavors to make the head engage, by resorting to tractions in the proper direction. Of course, as this descends, he must accommodate the line of traction to the axis of the part through which it is passing.

In case of necessity, and if there was no embryotomy forceps at hand, the practitioner should resort to the crotchet, and carefully fix it on one of the most solid parts of the cranium. But the greatest possible care must be taken to prevent its slipping, and to protect the soft parts of the mother from its point. However, it is out of the question to lay down positive rules for the regulation of its use in all cases; the operator must be governed by circumstances.

B. Presentation of the Pelvic Extremity.—Should the head be arrested by a retraction of the pelvis, after the delivery of the breech, and the attempts made for its removal prove ineffectual, a resort to craniotomy appears to us the only resource, whether the child be living or dead. But in these cases the base of the cranium presents, a perforation of which is attended with much more difficulty than any other part; and, therefore, the point of the perforating instrument ought to be entered at the posterior part of the occipital bone. The application of the embryotomy forceps will also require greater precaution, and will be attended with more difficulty, from the presence of the trunk in the excavation; and, should this obstacle prove insurmountable, the child may be decapitated, and the head alone be left in the parts.

But this is not the only case in which the separated head is left behind in the uterus, for it will presently appear that a similar course is adopted in certain trunk presentations; or, the same thing may happen from ignorance or stupidity. In all cases the head has to be delivered, and its extraction is exceedingly painful when the pelvis is much deformed; for it then presents by its base, thereby rendering a perforation more difficult. Under such circumstances, it has been recommended to attempt a conversion of the head, so as to bring some portion of the cranial vault to the superior strait, which of course should be done whenever possible. The excessive mobility of the head singularly favors the slipping of the perforator, and exposes the mother's parts to laceration. The best way of preventing this accident, is to direct an assistant to place both hands over the hypogastric region, and fix the head there by making a considerable pressure at that point.

But the difficulty is not brought to an end by the perforation of the cranium, for even then the embryotomy forceps will often become necessary if the retraction is excessive; and, owing to the mobility of the part, its application is very imperfect, and it is likely to slip at the first tractive effort. The trouble in getting hold of the head is not merely dependent on its mobility, because, when the inclination is very great at the superior strait, it is found above the pubis, and therefore cannot be reached by the instrument, which is necessarily directed posteriorly, in consequence of its moderate curvature.

It was to a circumstance of this kind that I attributed the failure of the attempts made on one occasion by M. Paul Dubois, at *la Ma-*

ternité. The Professor, being worn out by several hours of fruitless manipulations, had the kindness to permit my assistance. I introduced the right hand, and got hold of the lower jaw, which I attempted to draw down, but without any better success, as the base of the cranium was arrested by the symphysis; I found that the failure of my tractions was owing to the fact of their being directed too far downwards and forwards; I then substituted a blunt hook for the finger, and fixed it on the lower jaw, when, by depressing the handle of the instrument posteriorly, so as to make it operate downwards and backwards, I was soon fortunate enough to get the head into the excavation, from which it was readily delivered afterwards.

Most of the difficulties met with in this case might certainly have been prevented, by using the instrument just described, invented by myself.

c. *Presentation of the Trunk.*—The version is not always practicable in the trunk presentations; for instance, where the membranes have been ruptured, and the waters discharged for some time, and the shoulder is low down in the excavation, a forcible contraction of the uterus may render an introduction of the hand and a version of the foetus absolutely impossible. In such a case, we have nothing to do but to wait for the occurrence of a spontaneous evolution, if the child is living; but, as soon as it is dead, we must promptly relieve the mother from the dangerous consequences of a prolonged labour.

To amputate the arm under such circumstances is altogether useless, because its presence cannot incommod the operator; and, besides, it may afterwards prove very serviceable by favoring the tractions; it is on the body we have to act. Various plans have been suggested for this purpose, but those described by Celsus and Dr. Lee are the only ones that appear practicable. In cases of this kind, Celsus had recourse to decapitation; and I have known this plan to be employed by M. Dubois on several different occasions. He acts in the following manner: Having ascertained the exact situation of the child's neck, he introduces the whole hand into the uterus (the left one when the head is at the right side, and the right one when it is at the left), and, hooking the index finger over the cervical region, he endeavors to draw it downwards, so as to make this part more accessible; should the finger not prove sufficient, the blunt hook is advantageously substituted for

Fig. 113.



Mode of using the blunt hook in the trunk presentations, to bring down the neck.

the same purpose (*vide* Fig. 113). A pair of long scissors, having thick and very sharp blades, and moderately curved on one side, so as to correspond with the axis of the pelvis, is then guided up to the infant's neck along the palmar surface of the hand previously introduced; then the blades are opened a little, and a small portion of the neck is cut, then a second, and thus, by repeated small incisions, its whole extent is gradually divided. When the decapitation is completed, he draws on the arm which is usually found in the vagina, in this way extracting the trunk without much difficulty; and afterwards he delivers the head in the manner above stated.

Ramsbotham, Sr., devised an instrument resembling the blunt hook, and having a cutting blade concealed within its curved part; when the neck is properly secured, this blade is detached from the principal stem, so as to operate like the guillotine on the child's neck.

The decapitation is not always feasible, at least we could not succeed in effecting the section, in a case to which we were called by Doctor Leveillé. The head and neck were so high, and the uterus so much retracted, that it was not possible to get the hand and scissors far enough up to embrace the neck properly; after several fruitless attempts, we determined to perform the operation recommended by Doctor Lee, but, before doing so, concluded to try the pelvic version. The right hand was passed in as far as the breech, but it could not reach the feet; the fore-finger, curved like a hook, was then pushed into the anus, and the other fingers firmly grasped the buttocks, and whilst this hand was pulling on the breech, the side of the foetus, which had already engaged in the excavation, was pushed upwards and to the right by the fingers of the other hand. By operating in this manner for five or six minutes we were fortunate enough to bring down the pelvic extremity, and thus terminate the labour favorably as regards the mother. The lying-in presented nothing unusual.

Doctor Lee's method consists in separating the arm from the body, as also in perforating the thorax and abdomen; then, by fixing the blunt hook on the pelvis or lower part of the spine, he makes use of sufficient force to bring the child down double, and thus effects its delivery by a mechanism very similar to the spontaneous evolution. Perhaps it would be better to follow Davis' plan, and divide the trunk in two, and afterwards extract the parts separately.*

* M. Payan of Aix, resorted to Davis' operation in one instance, where the trunk was low down in the excavation; but this plan certainly did not originate with him. (*Gaz. Med.*, 521, 1840.)

PART V.

OF THE DELIVERY OF THE AFTER-BIRTH.

THIS comprises the natural or artificial expulsion of the foetal appendages from the mother's womb; and it constitutes the complement of the labour. Like the latter, it is generally accomplished by the unaided powers of nature, though in certain cases, which are fortunately very rare (about one in two hundred), it is attended by difficulties or complicated by accidents that may require the intervention of art. We shall, therefore, have to treat of the natural and the artificial delivery of the after-birth.

ARTICLE I.

OF THE NATURAL DELIVERY OF THE AFTER-BIRTH.

The uterus retreats immediately after the child is born, its walls retract owing to the inherent contractility of their peculiar tissue, and its cavity diminishes; but the placenta, from being a spongy and non-contractile mass, does not follow this action of the organ. Consequently, it becomes puckered up, and the cellular and vascular tissues, that connect it to the internal uterine surface, are rendered tense and are torn, as the difference in the respective size of the two bodies becomes more marked under the force of the repeated contractions. A rupture of all these bonds of union is soon effected, the placenta is completely detached, and it descends by its own gravity to the os uteri; the latter, being irritated by its presence, reacts on the body of the organ which is immediately thrown into contraction; the internal orifice, which was diminished after the child's delivery, again dilates, and the placenta, being driven from the uterine cavity, passes into the vagina, whence it is forced outwards by the contraction of the vaginal walls aided by the abdominal muscles.

Hence there are three distinct stages in the delivery of the after-birth; which we may divide, like Desormeaux, into the detachment of the placenta, its expulsion from the uterus, and its expulsion from the vagina.

The detachment of the placenta is not always accomplished in the same way; the process varying with the part of the uterus to which it is united. For instance, when attached to the fundus, the separation first begins near the centre of the mass, because this is the thickest part, and it cannot accommodate itself to the retraction of the uterine walls; whilst its thinner margins, being more easily wrinkled, are less liable to lacerate the tissue connecting them with the womb; a lenticular cavity is thereby created, which is bounded externally by the still adherent borders of the placenta. A quantity of blood is gradually effused into this cavity, which contributes, with the uterine contractions, to effect the separation; that is to say, the detachment is effected from the centre towards the circumference. The placenta, being wholly detached, then descends to the orifice, its foetal surface corresponding to the latter; or, in other words, becoming the external face, whilst the uterine surface is the internal face; which latter, together with the inverted membranes, constitutes a pouch, wherein such a quantity of fluid or coagulated blood is occasionally collected, as to seriously impede its delivery.

When it is attached to the anterior, the posterior, or the lateral portion of the matrix, the separation commences at one of the margins; or, if at the centre, it is soon propagated towards one border, generally the superior, though in some instances the inferior one. In the former case, the process advances in the way just described, and the placenta again presents, by its foetal surface, at the cervix uteri; but, in the latter, being suspended on the uterine wall until the detachment is completed, it presents at the neck by its inferior margin, which is often doubled in the form of a gutter, and it engages in the orifice rolled up in a conical form.

When the placenta presents its foetal surface at the os uteri, it plugs up the orifice by its bulk, and prevents the blood from escaping; wherefore, its delivery in such cases is usually followed by the expulsion of numerous large coagula. But where only one border engages, there is no obstacle to the issue of the blood, and hence the discharge of this fluid commences with the detachment of the after-birth, is increased at every pain, and persists throughout the whole process.

From the description just given, the reader would naturally suppose that the detachment of the placenta only begins after the child is born; but this, however, is not always the case. In fact, the following phenomena are more usually observed to take place: as soon as the labour pains are developed and the dilatation of the os uteri has commenced, the separation of the ovum begins in the neighborhood of the uterine orifice, and then gradually progresses over all parts of its surface, although not in a perfect and complete manner. After the membranes are ruptured, and the waters are partially discharged, the uterine cavity diminishes; the ovum becomes wrinkled, and its detachment is carried to a still greater extent; even involving the after-birth, as proved by the fact that fluid, or coagulated blood, is frequently expelled simultaneously with the foetus, in

cases of protracted labour; which blood must evidently come from that portion of the uterine surface in contact with the placenta. A separation of the greater part of the placental mass is particularly apt to occur in the breech presentations, in consequence of the womb's gradual retraction as the lower parts of the foetus are delivered.

The interval between the child's birth and the delivery of the secundines is very variable. Dr. Clarke, from a great number of observations, established its mean duration at twenty-five minutes; but if by this a perfectly spontaneous delivery is to be understood, one where no traction is made on the cord, we believe he is in error, for this interval is generally much longer. At the instance of M. P. Dubois, we made some experiments, in 1836, with a view of determining this question; and those researches proved that, when the delivery was left entirely to nature, the final expulsion of the placenta did not usually occur under an hour or an hour and a half after the birth of the infant. It is true, the detachment of the after-birth, and its removal from the uterine cavity, is effected, as Clarke states, in the course of fifteen, twenty, or twenty-five minutes; but, having passed into the vagina, it sometimes remains there for several hours without causing the least irritation by its presence, the least tenesmus, or bearing-down effort. This circumstance is easily explained by the fact that the sensibility of the vaginal walls is blunted, as it were, by the long pressure they were subjected to from the head and other parts of the child. Besides which, as Levret long since remarked, the after-birth will be the sooner expelled in proportion as the patient is stronger, and the contractions more energetic; as the quantity of water in the womb was smaller, and as the period between the rupture of the membranes and the child's delivery was the longer.

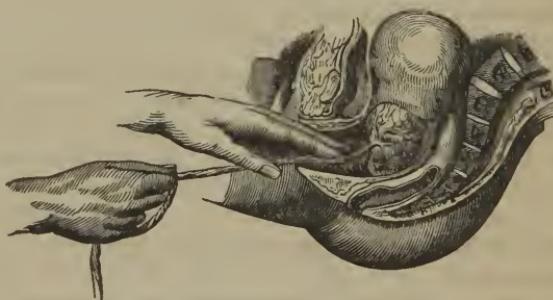
Although its delivery may generally be left to the powers of nature without any serious inconvenience, yet it is equally true that it will be delayed a long time in a large number of cases. Now such a delay would force the patient to remain on her little bed, which is poorly adapted to repose after all the fatigues of labour; and besides, so long as the delivery is not completed, she still considers herself exposed to numerous dangers, and her fears may have an unfavorable influence over her condition. On this account, most of the accoucheurs of the present day believe it advisable to accelerate the extraction a little, for the purpose of relieving the woman from her anxiety, and of sparing her unnecessary pain; without, however, attempting to deliver the secundines *immediately* after the child's birth. But, before making any traction on the umbilical cord, it is necessary to ascertain that the placenta is really detached. Now we know that the separation is usually accomplished by the fresh contractions that reappear after the apathy which follows the child's expulsion; and hence, there is every reason to suppose it is completed when these contractions have repeatedly occurred. A little blood usually escapes from the vulva during the process. The uterine globe, which was previously soft, is found by the abdominal

palpation to be hard and resistant ; besides, the after-birth is found presenting at the orifice of the womb when the finger is introduced into the vagina ; for, if it should not be met with, the accoucheur may rest satisfied that the separation is not yet completed, and therefore he ought to wait. Should the detachment be delayed too long, frictions over the fundus uteri are resorted to, for the purpose of rousing the pains, or the same object is produced by titillating the cervix uteri with one or two fingers.

Certain writers recommend a ligature on the placental extremity of the cord after the child's birth, for the sole purpose of facilitating the detachment of the after-birth. The easy separation when this has been done, says M. Stoltz, is caused by the weight and turgescence of this organ, which, when expelled, is found to be engorged with blood ; this practice is at least beneficial in preventing the patient's bed from being soaked with the blood that ordinarily escapes from the cord.

After its entire separation, the after-birth constitutes a foreign body in the uterine cavity, which the organ endeavors to dislodge by contracting. These contractions, which are recognizable by the hardness of the uterine globe, and which are usually perceptible to the patient, indicate the time for operating ; the accoucheur then takes hold of the umbilical cord, after having enveloped it with a cloth so as to prevent it from slipping, and winds its end around one or two fingers ; he next makes a moderate traction with a view of stretching out its loose folds, but, as soon as any resistance is felt, he ought to slip up two or even three fingers of the other hand along the upper surface of the cord as far as the os uteri ; the points of

Fig. 114.



The mode of extracting the placenta.

these fingers, which are intended to press the cord backwards, are brought together so as to receive the latter in the entering angle thereby formed, around which it plays like a pulley. To understand the advantage of this manœuvre, it is only necessary to bear in mind that the tractions made by one hand alone would correspond to the axis of the vagina, which forms an angle with that of the uterus ; whence it happens that the placenta, instead of being drawn towards the centre of the orifice it has to traverse, would abut against

its anterior border, and the corresponding parts of the cervix, upon which all the tractive efforts are spent. The patient should be directed to bear down while the tractions are made. As the placenta clears the orifice, and gets into the excavation, the operator changes the line of action, and gradually carries the cord forward, so as to make it always correspond with the axis of the pelvic canal. Under the joint influence of the tractions and the patient's bearing-down efforts, the placenta soon reaches the vulva, where it is seized by the thumb and fingers and twisted round several times, so as to complete the detachment of the membranes and form them into a solid cord, for the double purpose of preventing their laceration and of securing their entire removal.*

"When the placenta is partially engaged in the orifice by a portion of its periphery, this plan," says M. Guillemot, "ought to be somewhat modified; for, in this presentation, the root of the umbilical cord, instead of corresponding to the cervix, is higher up in the uterine cavity; and hence, if the operator resorts to traction, the centre of the placenta will have a tendency to enter the orifice, and thus add its bulk to the disc already engaged there. Such a disposition sometimes constitutes an obstacle to the further delivery of this mass; but it is surmounted by making some moderate tractions, not on the cord itself, but rather upon the part previously engaged, by applying two fingers on its surfaces." We have had numerous opportunities of testing the practical utility of M. Guillemot's advice.

"This seems," says Merriman, "all that it is right to do, for a full hour after the child is born; but that time being elapsed, and there being no reason to expect that uterine contractions will spontaneously arise, the accoucheur is to consider whether it is prudent to wait longer, before he proceeds to extract the placenta, by introducing his hand into the uterus.

"If no bad symptoms are present, and unless there be hemorrhage the symptoms can rarely be considered bad, there can be no danger in allowing more time to elapse before we proceed to this operation; and more especially, if there be reason to think that the retention arises principally from the exhausted state of the patient; because it is possible that a little more delay will recruit her strength, and that afterwards sufficient power may be imparted to the uterus to expel the placenta.

"Yet, generally speaking, we can have but little expectation that

* There certainly would be no very great danger in leaving a portion of the membranes in the uterine cavity; although, in addition to the accidents that may arise from the presence of a foreign body there, the following phenomenon might possibly occur. The membranes may enclose some coagula, and thus form a whole whose expulsion is often difficult. In the course of a few days, the uterus, being irritated by the presence of this inconvenient lodger, begins to contract, and the woman experiences some colicky pains, varying in intensity with the strength of the contractions; a little blood escapes from the vulva, and, after the pains have lasted for a longer or shorter period, the patient is finally delivered of the foreign body, or, according to her expression, of a *large piece of flesh*, the appearance of which causes great alarm.

the placenta will be expelled by the natural powers, after it has been retained much more than an hour; we may, therefore, consider ourselves justified in interfering to extract it, at the end of an hour or two after the child is born.

"It appears, then, to be a question of prudence or discretion, which every accoucheur must judge of, in the individual case he is attending, whether to proceed to delivery at the end of the hour, or to wait another hour or two before he undertakes this operation. But, of course, this only applies to cases where there is no apparent danger." (*Synopsis*, page 153.)

"The time for interference of the accoucheur for the delivery of the placenta, should always be regulated by the condition of the uterus itself," says Dewees, "and that condition is whenever it is firmly contracted. Time, simply considered, can never form a safe rule for the delivery of the placenta; the *degree of contraction of the uterus* alone can point out the proper moment to operate, or teach us when it would be improper to attempt it. This rule, I believe, will never deceive, or at least, I have uniformly acted upon this principle; and, so far, I think I am safe in saying, I have not had cause to believe it wrong." (*System of Midwifery*, page 447.)

As soon as the placenta is delivered, we must ascertain whether any portion of it, or of the membranes, has been left behind in the womb; but this is easily done by carefully examining the secundines. Should it happen that the membranes or after-birth are not extracted entire, it would be proper to pass the hand into the uterus, for the purpose of removing the remnants.

If a large quantity of the coagula that usually accompany the placenta remains in the matrix, they may subsequently become a source of the after-pains before described. Consequently, if there is reason to suspect the presence of large clots in the womb, the latter ought to be stimulated to contraction by repeated frictions over the hypogastrium. Some authors have even recommended the introduction of the hand into the uterine cavity, so as to rid it completely of all foreign bodies; but this advice ought not to be followed, because, on the one part, the uterus would be unnecessarily irritated, and, on the other, this would not prevent the subsequent formation of fresh coagula.

We stated above that usually in the course of fifteen, twenty, or twenty-five minutes after the birth of the child, the uterus, by contracting, notifies the accoucheur, as it were, of the proper moment for his intervention. It should always be remembered, however, that moderate tractions are all-sufficient for the delivery of the after-birth; and, if much resistance is met with, it would be far better to wait, and not make any new attempts, until the contractions shall have partly or completely overcome the obstacle.

Where there is the least reason to suspect the existence of a second child, after the birth of the first, the physician ought to satisfy himself on that point, both by an external and an internal exploration, before attempting to remove the placenta; and should a twin pregnancy be recognized by the great size of the womb, and more par-

ticularly by the vaginal examination, a ligature is to be applied immediately on the placental extremity of the cord belonging to the first infant; and the secundines are only to be extracted after the expulsion of both children. If, however, the placenta were detached, and presented at the orifice, he should attempt to extract it, more especially when it seems to obstruct the passage of the second fœtus. Nevertheless, such tractions ought to be exceedingly reserved; because, in compound pregnancies, there are frequent adhesions between the two placentas; and, if this were the case, it is evident that any forcible traction might detach the after-birth of the second child long before its expulsion; and this premature separation would render the mother liable to a mortal hemorrhage.

After the birth of both children, so far from pulling on the two cords simultaneously, and moderately twisting them into one, it is more prudent to bring down the placentas, one after the other, giving the priority to the one which offers the least resistance. The mass of these conjoined bodies is made to engage in this way by one extremity; and it is thus enabled to clear the uterine orifice more readily.

In most cases of compound pregnancy the womb is excessively distended, and this distension, as we are all aware, is one of the circumstances that is most likely to enfeeble the contractility of its tissue; therefore the removal of the after-birth, after the labour is over, should not be accelerated too much, and the womb must be allowed a longer time than usual for its retraction; while moderate frictions are to be made over the fundus of the organ for the purpose of stimulating its action.

As regards the removal of the secundines after a miscarriage, we have nothing to add further than what was stated in the article on *Abortion*. (*Vide p. 265.*)

ARTICLE II.

OF THE ARTIFICIAL DELIVERY OF THE AFTER-BIRTH.

The obstacles that may require an artificial delivery of the after-birth, are caused either by the inertia of the womb, the excessive volume of the placenta, the weakness of the umbilical cord, the irregular contraction of the organ, or by the intimate adhesions of the placenta itself.

Whenever repeated attempts to effect its delivery, made in the usual way, prove ineffectual, the attendant ought to search for the cause of the delay, both by the abdominal palpation and by a vaginal exploration. One of two things will then occur; either the placenta will be found lying over the internal orifice, or it will be so high up that the finger cannot reach it. Supposing the previous tractions had been made in the proper direction, an obstacle to the delivery in the former case could only depend on the unusual size of the after-birth, on the fragility of the umbilical cord, or on a

contraction of the cervix uteri; in the latter, the placenta must evidently be retained at the fundus either by abnormal adhesions, or by the irregular contraction of some part of the uterine walls. This first diagnosis being once established, the operator only has to decide upon which of those circumstances the delay is dependent.

§ 1. INERTIA OF THE WOMB.

We have hitherto stated that the retracted uterus forms a large, hard, and resistant tumor in the sub-umbilical region after the child is born. Now, it may happen, either from the general debility of the patient, or from the feebleness or atony of the womb itself, that its organic contractility is not aroused, and the organ still remains after the infant's birth in a state of partial or complete inertia.

This inertia of the womb (which will claim our special attention, when treating of the hemorrhage that so frequently accompanies it after the delivery) may be simple, or complicated with flooding; but we have only to speak of the first variety at the present time.

This condition is recognized by the large, soft, and insensible tumor, which is detected by applying the hand upon the abdomen.

If the inertia of the womb is not attended with flooding, it is probable that the placenta still remains undetached; and therefore no imprudent tractions should be made on the cord, lest a separation occur before the inertia is remedied. For these would inevitably produce a frightful hemorrhage, which might cost the patient's life in a few minutes; or, should the placental adhesions resist the tractive efforts, the womb would be drawn down along with the after-birth, thus producing a partial or complete inversion of the organ. It is, therefore, a truly fortunate circumstance when the inertia is manifested before the separation of the after-birth has commenced. A further source of hemorrhage is found in the umbilical vessels; but this accident is exceedingly rare, and besides it can easily be remedied by applying a ligature on the cord.

The best of all remedies in cases of simple inertia, is to wait until the uterus regains its powers: the return of the contractions might be accelerated, however, by moderate frictions over the lower part of the belly, or by titillating the os uteri with one or two fingers in the vagina, and by the application of cold compresses over the hypogastric region, and on the upper part of the thighs. In cases of partial inertia, some English practitioners, Dr. Murphy in particular (*London Med. Gaz.*), have recommended a tight bandage around the abdomen; or preferably, a resort to immediate pressure over the uterus, by applying both hands on the sides of the organ. M. Guillemot asserts that he has often succeeded in arousing and keeping up the contractions by plunging the end of the cord in a basin of cold water; but we can scarcely comprehend how this singular result can occur. The patient's strength is to be kept up at the same time, by some broth, or possibly, by a little good wine; but this latter article, as well as the cordial stimulants recommended by the older accoucheurs, which frequently gave rise to the most dangerous hemorrhages, requires the exercise of a sound discretion.

§ 2. EXCESSIVE VOLUME OF THE PLACENTA.

This may be owing either to an actual increase in its size, or to the collection of large coagula in the pouch of the membranes created by the placenta's inversion, when it fell down upon the os uteri, after its detachment. This source of difficulty is easily recognized by observing the unusual volume of the uterus above the pubis, and by detecting the detached mass at the os uteri by the finger.

In most instances, the natural contractions of the womb, assisted by a moderate tension on the cord, are all-sufficient for the delivery of the after-birth; though it has occasionally been necessary to pass the hand into the vagina and to carry one or two fingers up into the uterine cavity for the purpose of hooking this body. Where the increased size is owing to the accumulation of coagula in the pouch, the membranes (if within reach of the finger) or the placenta itself should be perforated so as to afford an outlet to the fluid part of the blood, whereby the total mass is diminished, and its subsequent expulsion or extraction is facilitated.

§ 3. WEAKNESS OF THE CORD.

This debility, whether owing to the want of development in the cord itself, as happens in cases of premature labour, or to the particular mode of distribution of the umbilical vessels, so well described by Benckiser in his inaugural thesis (*vide* page 197), may facilitate its rupture; and hence the operator ought to be very careful in pulling on this part. Again, a laceration of the cord during the delivery, may be dependent on its oblique attachment to the placenta. Therefore, as a general rule, whenever the hand feels it giving way during the traction (for it produces a peculiar yielding sensation), the attempt should be discontinued; and, unless there are some special reasons to the contrary, the further delivery must be left to the powers of nature.

In conclusion, if, notwithstanding all proper precautions, the cord does become ruptured, he has only to introduce the hand into the vagina, and pass up two or three fingers into the uterine cavity, so as to seize and extract the placenta.

§ 4. IRREGULAR OR SPASMODIC CONTRACTION OF THE UTERUS.

The causes of uterine spasm are very obscure; though, according to Stoltz, the predisposition exists in the organ itself. If any exterior causes can contribute to its production, they certainly must be those which have a special action on the womb: such as improper frictions or manipulations, pulling on the cord, and the abuse of stimulating remedies, the ergot, particularly. Again, the irregular contractions of the uterus are more frequently remarked after a twin labour than others. The modern authors, who have made this a subject of special study, do not fully agree with each other, in regard to the sequelæ of these irregular contractions. The different forms exhibited by the uterus in such cases have been reduced, by M. Guillemot, to two principal varieties: the one depending on the conformation of the matrix, and the other developed as a conse-

quence of the presence of some foreign body in this viscus. The former is designated by him as the *hour-glass*, or spasmody contraction of the neck at its internal orifice; the latter by the term *encystment*, or the irregular contraction of the body of the womb.

We shall follow the example of M. Stoltz, by admitting four distinct varieties of uterine spasm, namely: 1st, a spasmody contraction of the external orifice of the neck; 2d, that of its internal orifice; 3d, that of one or more portions of the body of the uterus; and, 4th, a spasmody contraction of the whole womb.

A. *Spasmody Contraction of the External Orifice*.—A person who has had many opportunities of observing the softness and flaccidity of the cervix uteri at its lower part after the child is born, can scarcely comprehend the possibility of a spasm at its outer orifice; and hence many authors have altogether denied its existence. Besides, it must be evident that, even if such a condition were to occur, it would constitute but a momentary obstacle to the delivery of the after-birth; and therefore we would only have to wait until the spasm of the orifice had yielded before the force of the contractions. Or, if any accident should occur requiring a prompt delivery, the resistance might be surmounted without difficulty.

B. *Spasmody Contraction of the Internal Orifice*.—This is what M. Guillemot understands by the term *hour-glass* contraction of the womb; and we quote a considerable part of his excellent description of it. When the hand is introduced, the cervix is found projecting into the vagina, and so disfigured that it resembles a section of the large intestine; but, about one or two inches above this, the finger is arrested by a kind of stricture, which is the wrinkled and contracted internal orifice. According to Madame Boivin, the uterine neck sometimes measures five to six inches in length and four to five in diameter, in this state of flaccidity; the cavity of the womb containing the placenta is found above the retracted part. In some instances, the uterine walls are firmly contracted around this mass, whilst at others they are in a state of partial or complete inertia. The cavity of the matrix is thus divided into two portions. Where the upper one is contracted on the placenta, as most generally happens, its volume does not exceed the moiety of the whole organ; and hence the retraction, although seated at the internal orifice, seems to exist very near the middle of the uterus; which circumstance has induced many practitioners to suppose that they had encountered an irregular contraction of the body of the womb.

In most cases, the after-birth is retained entirely within the superior cavity; but this is not always the case, for, in some instances, this vascular mass has been found strangulated, to a certain extent, by the stricture of the neck, one part being retained in the upper portion and one in the lower. Whence it may happen: 1st, that a very small portion of the placenta projects into the vagina; or, 2d, that it is strangulated near its central part; or, 3d, that more than one-half of the placenta hangs down below the strictured orifice;

which different circumstances, as we shall have occasion to show, modify the treatment.

The hour-glass contraction is recognizable by the shape of the uterus, and by the resistance offered at the internal orifice, both to the placenta, and to the accoucheur's finger. The organ is found hard and contracted, when felt through the abdominal walls, and all tractions on the cord prove ineffectual; besides which, the operator, by resorting to the touch, will find the placenta above the internal orifice; which latter is retracted, whilst the walls of the neck below are soft, flabby, and pendent in the vagina; and, lastly, there is no discharge of coagula, and sometimes even no blood of any consequence escapes.

Where the stricture is not accompanied by any pressing symptoms, the spasm generally gives way in the course of a few hours; the uterus then regains its normal form, and the after-birth is expelled. Should it persist longer than four or five hours, the opiate preparations might first be resorted to, followed by venesection, if indicated by the general phenomena of plethora; bathing might, likewise, prove very useful. But if, notwithstanding the employment of all these measures, the spasm does not yield, or if it is complicated by an alarming hemorrhage, we must forthwith attempt the dilatation of the strictured part. This is effected by first introducing one finger, then two, and then three, with a view of enlarging the orifice by degrees until it will admit the whole hand. The advice of M. Stoltz, to smear the fingers with belladonna ointment, might prove serviceable. Should a portion of the placenta be engaged in the retracted part, our course would evidently vary under the different circumstances alluded to above. For instance, if a very small portion only of the after-birth is engaged, the operator ought to push it up, and then penetrate into the uterine cavity, in the way just described; but if strangulated near its central part, the fingers are to be slipped up between it and the neck, and then the part that is still above the stricture is to be gradually drawn down. Again, if most of the placental mass is already clear, we must get hold of this free portion, and by compressing it forcibly in the hand, endeavor to reduce the size of the strangulated part, and thereby effect the delivery of the whole.

c. *Irregular Contractions of the Body of the Womb.*—The matrix, in contracting, becomes accurately applied on the body contained within its cavity; and, of course, where the placenta still remains undelivered, the womb retracts upon it. As the contractions operate at all parts, the walls of this organ, being opposed to the circumference of the placenta, and, consequently, meeting with little or no resistance, gradually approach each other, and shut it up within their cavity; this constitutes the enclosure of the placenta; and it may assume two very distinct forms, to which different names have been applied, i. e., the encystment and the encasement.

Encystment is that variety where the placenta is so surrounded on all sides, excepting at the door of the cell for the entrance of the umbilical cord, that it is absolutely imprisoned. Encasement is that

in which the uterine walls, in contracting upon the circumference of the placenta, constitute around its margin a kind of collar, or frame, which encases it, just as the turgid conjunctiva surrounds the cornea in chemosis.

These two species may either be partial or complete: the encystment is said to be complete, when the placenta is altogether shut up in the cell or cyst formed by the retracted uterine walls; and incomplete, where some portion of it breaks out of the door of the cell. In the latter case, the cell is perfect, being lined throughout by the centre of the placenta, whilst the other parts of the latter, that have escaped from the cyst, are attached to the neighboring portions of the uterine walls.

The encasement is complete, when the collar formed by the retracted uterine fibres surrounds or encases the whole circumference of the placenta; and incomplete, where it only exists on a part of the periphery of this vascular mass.

In some instances, the matrix is not moulded on the circumference alone of the placenta. "For if," says M. Velpeau, "the after-birth were solid and even, like the head, the womb in contracting would necessarily retain the form of an ampulla; but the cotyledons, in the process of the detachment, may separate from each other, and the placenta would then offer more resistance in some parts than in others; so that the uterus soon divides into several compartments, or divisions, more or less distinct from each other, and each of which embraces some portion of the after-birth." In these cases, the hand, in effecting the artificial delivery, would necessarily have to penetrate through four, five, or occasionally even six circular strictures, after having dilated them.

The encystment may be complicated by a retraction of the internal orifice (*vide Fig. 115*); but, in most of the recorded cases of this kind, the resistance has easily been surmounted.



The hour-glass contraction of the womb.

It may take place at any portion of the womb whatever, though more rarely at the fundus than elsewhere; which is probably owing to the circumstance of the fibres in this region being more active, so that the detachment of the placenta, when it is inserted at the fundus, is accomplished much sooner.

The encystment may be recognized without much difficulty; for, by palpating the lower part of the belly, two tumors are detected just above the pubis, formed by the body of the uterus; the larger of which contains the after-birth, and the other, placed below or towards one side, and joined to the first by a kind of neck, constitutes the remainder of the uterine globe. And, by following the cord with the index finger up into the cavity, we find its lower portion but little retracted; though further up the finger detects a small rounded opening, the orifice of the cell,

through which the cord passes; and beyond it are the irregular walls of the cyst, enclosing the placenta.

Here, also, the accoucheur ought to wait, if the encystment is not complicated by any accident; endeavoring, however, in the mean while, to favor the womb's return to its normal form, by a resort to the measures before advised. When any danger threatens the mother's life, he ought to dilate the orifice of the cyst with the ends of the fingers, and thus penetrate carefully into its cavity. (*Vide Fig. 116.*)

While these attempts are being made internally, the other hand, placed on the hypogastrium, must grasp the fundus, and keep it in position. Douglass, who devoted particular attention to this subject, avers that the placenta is generally still adherent; but Ramsbotham, Dewees, and several others assert, on the contrary, that it is usually detached. In the former case, the operator would have to attempt its separation; always taking the precautions mentioned below. It is to be delivered by taking hold of one border, with a view of making it clear the mouth of the cyst more readily; and if it is but partially encysted, the index finger is entered and passed around that portion of the placenta held by the periphery of this opening; in this way both relieving the stricture and disengaging the encysted part.

Instead of attempting to dilate the mouth of the cell, which is often very difficult, M. Dubroca, of Bordeaux, has suggested a new plan, which is styled by him the method of erosion; it consists of the introduction of a finger into the opening of the cell, and then, by the aid of this finger, tearing up and reducing the placenta to fragments, which are afterwards expelled. He says this mode proved successful in some instances where he could not succeed in passing two or three fingers into the cyst in the usual way.

D. Spasmodic Contraction of the whole Organ.—M. Stoltz relates an instance in which he was called to a woman who had been delivered an hour previously, by a midwife, after the administration of two scruples of ergot; the latter, being unable to extract the after-birth, thought proper, before sending for him, to exhibit a sixth dose of eight grains. On his arrival, he found the woman's general condition favorable; the fundus of the uterus extended nearly up to the umbilicus, and the entire organ was developed as much as at the fifth month; but its walls were contracted to such a degree that it was quite firm and hard. Following up the cord, the index finger reached the external orifice, which was greatly retracted, and scarcely permitted the introduction of the first phalanx; every part of the matrix within reach was firm and contracted, just

Fig. 116.



Mode of dilating the strictured part.

like the fundus and body. Of course, the delivery of the after-birth was out of the question; besides, no complication indicated its necessity. It was then about half past two o'clock in the morning; a draught, consisting of half a drachm of Hoffmann's anodyne liquor, and twenty minims of the common tincture of opium, was administered. The fundus of the matrix did not seem to be any less contracted at nine o'clock in the morning; but, by operating with care, M. Stoltz succeeded in dilating the orifice, and in passing three fingers up to the root of the cord; but, being unable to get any further, he withdrew his hand, and directed injections of a decoction of belladonna and hyoscyamus. These were repeated every half hour, and, at the fifth injection, the midwife found a portion of the placenta engaged in the vagina; she forthwith drew upon it, and succeeded in extracting it, twelve hours after the child's birth. Should a similar case again occur, the prudent course of the Strasburg professor ought certainly to be followed. In addition to which, venesection, tepid bathing, etc., might be resorted to, if indicated by the patient's plethoric condition.

On the whole, then, it would appear that the irregular contraction is generally partial, though it may be seated at any or every part of the organ; and, further, that all these cases are to be treated in the same way. That is: 1st, to wait patiently; 2d, in the course of a few hours to resort to frictions over the fundus, to titillations of the os uteri, and the opiate preparations by inunctions or injections, belladonna to the cervix, either in the form of extract or decoction, venesection, and general or local bathing. Burns recommends the sudden application of cold compresses. In most instances, the administration of the antispasmodics by the mouth, such as sulphuric ether, hyoscyamus, belladonna or opium, is of unquestionable service; and, 3d, when there is any complication that endangers the patient, the forced, though slow, gradual, and careful introduction of the hand, and extraction of the placenta.

§ 5. ABNORMAL ADHESIONS.

In the present state of our science, it is very difficult to point out a satisfactory cause for these abnormal adhesions of the placenta. According to most authors, they are owing to a fibrous transformation of the cellular filaments which hold the placenta and uterus together, whereby they acquire a degree of solidity sufficient to withstand the uterine forces. These adhesions* have also been referred to the degenerations of the placental tissue itself, as well as to various osseous and calcareous concretions. In a case detailed

* Dr. Durban furnishes an instance of an abnormal adhesion of the placenta, in which the latter was covered by an osseous or cretaceous substance; but Gooch, who reports the case, further remarks that he found the placenta partly ossified three times in the same woman, and that he never had any difficulty in delivering the after-birth.

Monro and Merriman also mention several cases, where they noticed patches of ossification on the uterine surface of the placenta; in which the latter, they go on to say, adhered, perhaps, a little more than usual.

by M. Stoltz, the bond of union was evidently formed by a layer of coagulated blood, which had served to arrest a hemorrhage at the fourth month of gestation. According to M. Gendrin, the adhesion is made by the circle which the reflected caduca forms around the placenta. Sometimes it is only produced at a few points of the uterine surface of the placenta, by the conversion of some part of the organ into a non-vascular, cellulo-fibrous tissue, by the accidental atrophy of one or more of the placental cotyledons; which atrophy not unfrequently occurs. But whatever may be the cause that produces such adhesions, there are certain persons who appear to have an unfortunate predisposition to them, since they suffer from this accident at every lying-in. The generally received opinion, of the truth of which, however, I have some doubts, is, that these abnormal adhesions result in consequence of an inflammation of the placenta, or of the uterine wall during gestation, which is terminated by the exudation of some plastic and coagulable lymph between the contiguous surfaces; and to this effused matter most modern writers attribute the adherence. The resistance varies, they say, according to the progress of the inflammation; that, where the latter has been acute, and the plastic lymph is soft and recent, the utero-placental adhesions are scarcely any stronger than in the normal state. But, on the other hand, if its chronic character has afforded the effused matter time enough to become organized and condensed, the adhesions will prove very troublesome. The thickness of this species of false membrane is very variable. Wrisberg declares that, in a case where it covered the whole uterine surface of the placenta, it amounted to two lines and a half at the inter-lobular fissures, and a line and a half upon the face of each cotyledon.

The adhesion may be more or less extensive; sometimes existing over the whole placental surface, but at others restricted to certain parts; for instance, it may exist at the margin or circumference of the after-birth, the centre being detached;* or it may be restricted to one or more points of its surface. It likewise offers various degrees of resistance; occasionally being feeble enough to yield readily, even to moderate tractions; though it is sometimes so strong that either the placental or the uterine tissue yields rather than the bond of union. In some instances, the adhesions are so firm that they cannot be broken up without the greatest difficulty, even after death. For example, Morgagni found a portion of the detached placenta hanging in the uterine orifice of a woman, who died thirteen days after her confinement; but the other part of it was so adherent, that he could scarcely separate it with a scalpel. The adherent portion

* It frequently happens, says Leroux (*Traité des Pertes de sang*, page 306), that the placenta is thus detached at the middle, but remains adherent by its margins. The same thing was observed by Albinus, in a woman whose womb he has sketched. "The female," he says, "whose matrix is represented in several of the plates, had a detached placenta, and there was a considerable quantity of clotted blood between it and the organ; it was adherent, however, around the whole border, whereby the flooding was prevented." (*Louis' Translation of Van Swieten*, t. vii. p. 145, and *Heister*, t. ii. chap. clv. p. 459.)

was indurated, and some traces of inflammation were found on the corresponding part of the matrix.

Whenever a considerable period of time has elapsed after the labour, without the delivery of the after-birth being effected, and yet the globular form of the uterus, its hardness and manifest contraction, clearly show that it is striving to detach and to expel the secundines, and where the finger, passed through the cervix uteri, does not detect the placenta, we have every reason to suppose that there is an unnatural adhesion of this mass. The following signs will then confirm our suspicions: after drawing on the placenta by means of the cord, the latter will be found to mount up as soon as it is relaxed; during the contraction, the uterine globe becomes harder and diminishes in volume, but after the pain is over it returns to its former condition much sooner, and more perfectly than in other cases; and, lastly, the existence of this complication is rendered unequivocal by carrying the hand up into the uterus.

The abnormal adhesions of the placenta may exist alone, or they may be complicated with some accident; its partial adherence is nearly always accompanied by a more or less profuse hemorrhage. In cases of simple adhesion, the accoucheur should always wait, for a delay of a few hours is often sufficient to effect the separation; then, after waiting for a couple of hours, the uterus is stimulated to contraction by the various means before indicated; but, if these prove insufficient, an injection of cold water is to be thrown into the umbilical vein. After having cut the end of the cord, and squeezed the vein so as to free it entirely of any blood it may contain, the cold liquid is injected into this vessel with a sufficient degree of force to diffuse it throughout the placental mass. This ought to be repeated, taking care to retain the fluid in the after-birth for several minutes by securing the cord. This injection evidently has a two-fold operation, affecting both the placenta and the womb; that is, it distends the former by the introduction of a new liquid into its vessels, thereby augmenting its size and weight; and the impression of cold on the internal surface of the latter, brings on its contraction and consequent diminution. This measure, therefore, ought not to be overlooked.

Where it fails, tractions on the umbilical cord are to be resorted to; though always, as advised by Levret, perpendicularly to the surface of the placenta. Because, when two sheets of moistened paper are glued together, continues this author, for the purpose of illustrating the importance of his precept, and you endeavor to separate them by sliding one over the other, that is to say, by drawing them parallel to their planes, you tear rather than detach them; whilst, by pulling perpendicularly to those planes, you will separate them without the least effort, as also without any laceration. In order to obtain a similar result in practice, the umbilical cord is carried towards the side not occupied by the placenta, by the intervention of two fingers passed into the vagina as far as the uterine orifice. But it is impossible to carry out this rule, as Velpeau and Guillemot justly remark, because both the foetal and the uterine

surfaces of the after-birth are in contact with the walls of the organ; besides, the fingers can only sustain the cord below the cervix, and hence, as a natural consequence, the cord will always be parallel with, not perpendicular to, the long axis of the womb, in whatever manner it be held. The same effect is produced equally well, in their opinion, by drawing on it without this artificial pulley. Though whichever plan be resorted to, the operator must never exert force enough in making the tractive efforts to rupture the cord, and he should desist as soon as he finds it yielding.

But, supposing all the local and general irritants, the injections into the umbilical vein, and the tractions upon the cord just recommended have proved ineffectual, what is to be done? Where the adhesions are complicated by any hemorrhagic or convulsive affection, all accoucheurs are harmonious on one point, namely, to persist in the attempts to effect the extraction. But the same unanimity does not exist with regard to cases of simple adhesion; for some, dreading the disastrous phenomena that may result from the retention, and subsequent putrefaction of the placenta, and the absorption of putrid matters, are in favor of terminating the delivery at every hazard; while others, on the contrary, fearing still more the consequences of the manipulations which are necessary for effecting the detachment of the placenta, advise us to abandon the whole to nature; at the same time recommending the ulterior symptoms to be met and combated as they arise by the appropriate measures.

Our own opinion is, that the course of Levret, of Baudelocque, of Desormeaux, and M. P. Dubois, is the best adapted to cases of this kind; that is, after having employed the various means so often spoken of, to introduce the hand into the uterine cavity, following the cord, which is then the best guide up to the placenta. Should this have been torn away, the latter could be recognized by the vascular ramifications which characterize its foetal surface, by its elevation above the inner face of the uterus, by its consistence, and by the dull sensation felt by the patient when the fingers bear upon it. The point of attachment being known, the next step is to ascertain whether the adhesion is complete or partial; in the latter case, it is recommended to insinuate the open hand between the external surface of the placenta and the uterine wall, and then slit up the adhesions with the finger, just as you would cut the leaves of a book with a paper-knife. (Fig. 117.) When this is done, M. P. Dubois thinks it is better to seize the detached part with the whole hand, and pull upon it with a view of completing the separation of the rest; but, if this proves unsuccessful, he next tears and brings away all the loose portion, leaving the

Fig. 117.



The mode of breaking up the adhesions of the placenta.

ulterior expulsion of those parts that still remain adherent to nature, without resorting to any further attempts. We could bring forward numerous cases in proof of the soundness of this precept. For example, we have known a rash operator to perforate the uterus completely whilst striving to separate an adherent placenta; and Leroux of Dijon, notwithstanding all his dexterity, had the misfortune to detach quite a considerable part of the internal muscular plane, in a case of partial adhesion, by pulling too strongly on the detached upper portion of the after-birth, in order to separate its still adherent lower part. Death soon followed in the case we allude to; and the surgeon of Dijon had a profuse hemorrhage to encounter in his, but he fortunately succeeded in arresting it by the application of the tampon.

When the placenta becomes separated at its central part, the margins being still adherent, a cavity is usually created at that point, in which the blood accumulates. Under such circumstances, the centre of the mass may be perforated, and the fingers be passed up through the opening, to complete the detachment; at least, such was the course adopted by Heister and Leroux. Furthermore, where the placenta is adherent throughout, the accoucheur operates on its external face, by slipping up the hand behind the membranes; and when it reaches the circumference of the after-birth, he first endeavors to detach one part, and, where successful, he pursues the same course as if it had originally been a case of partial adherence.

Finally, let us add, that it is not proper to persist too long, in those instances where a part, or even the whole of the placenta holds out against the properly conducted manipulations just advised; for its expulsion will probably take place sooner or later, either all at once, or in fragments.

The continuance of some portion of the placenta, and more especially of the entire mass in the uterine cavity, renders the patient liable to some dangers, which should be guarded against. Wherefore, during the early part of the lying-in, it is necessary to examine her repeatedly per vaginam, to ascertain whether the after-birth, or any part thereof, presents at the os uteri; and, if so, to remove it immediately, either with the finger, or Levret's abortion forceps. Emollient injections might be thrown into the womb several times a day, being repeated each time, until the returning fluid no longer exhales the odor of decomposition; if the latter is very annoying, a little chloride of calcium might be added to the infusion of marsh-mallows. As to the other complications, they are to be met by the appropriate measures. The object of these injections is to rid the uterus of the effete particles of the after-birth, as they become detached and putrefied.* M. Viellyamoz, of Moudon, in Switzerland, recommends the use of large quantities of water; he

* The injections ought to be made very gently, for a case recently observed by M. Hourman, and some experiments made on the dead body, would seem to prove that a liquid forcibly thrown into the uterus, might pass along the Fallopian tube, and get into the peritoneal cavity.

throws up an injection consisting of the warm infusion of marshmallows, by means of a large syringe, every five minutes; he prefers cold water, however, in cases of flooding. This operation is effected by the use of a long gum-elastic tube, one end of which is fixed in the uterine orifice, and the other extends beyond the vulva, or even the foot of the bed, so as to obviate the necessity of uncovering her; the returning fluid is collected in a basin placed under the patient. (*Gaz. Méd.*, 493, 1840.)

Absorption of the Placenta.—Where the after-birth is retained in the uterine cavity, it may disappear without any part whatever escaping externally; in other words, the absorption of the placenta is now one of the settled facts in our science. For the cases observed by Nægèle, Salomon, Stoltz, and others, no longer admit of any question as to the possibility of its disappearance by absorption, Madame Boivin to the contrary notwithstanding. It is important to bear in mind, however, as M. P. Dubois observes, that such instances are exceedingly rare, that they have subjected the patients to the most serious dangers, and that, although this possibility may, conjointly with the other reasons heretofore given, not only warrant but absolutely require the abandonment of all forcible measures, which might soon result in sad consequences, yet the accoucheur should never dispense with the use of every proper means of extraction, consonant with the mother's safety. Among the various remedies that have been particularly recommended of latter time, for preventing the disastrous effects caused by the putrefaction of the placenta, we may mention the use of injections of a weak solution of chloride of calcium into the uterine cavity, every hour; administering at the same time a draught containing a small dose of the acetate of ammonia. (*Charston, Gaz. Médicale.*)

ARTICLE III.

OF THE ACCIDENTS THAT MAY COMPLICATE THE DELIVERY OF THE AFTER-BIRTH.

The principal of these are hemorrhage, convulsions, and the inversion and rupture of the womb.

§ 1. OF HEMORRHAGE.

Of all the accidents that may precede, accompany, or follow the delivery of the placenta, a flooding is certainly one of the most frequent, and, at the same time, most terrible in its consequences. It may occur conjointly with either of the difficulties just described in the preceding article; and, where this does take place, the indications then laid down ought to be followed up more promptly. But, in addition to those circumstances, a hemorrhage may likewise take place after the child is born; and this claims our special attention, since it is nearly always accompanied by the complete or partial inertia of the womb. We have therefore to examine successively

the causes, the symptoms, the diagnosis, prognosis, and treatment of this inertia, considered with particular reference to the accident in question. We shall thus complete the history of puerperal hemorrhage, which was hitherto only described in part; namely, during the first six months, in the article on *Abortion*; and during the last three months, as also pending the labour proper, in that on *Accidental Dystocia*.

A. *Causes*.—After the child's delivery, and even during the progress of its expulsion, the uterine tissue becomes gradually retracted by the exercise of its contractility of tissue, whereby the cavity of the organ is considerably diminished; thus constricting the vessels that ramify in the substance of its walls, and reducing their calibre in a greater or less degree, thereby interrupting the circulation, and of course preventing the utero-placental vessels, which are torn by the detachment of the placenta, from becoming the source of a profuse hemorrhage. Now, under certain circumstances, this contractility of tissue is very feeble, and in others it is altogether wanting; in the former case the inertia of the womb is partial, in the latter it is complete; again, it may be total or partial, according as it affects the whole or a part of the uterine walls. All which various degrees of the affection may be developed under the influence of the same causes.

The causes of hemorrhage from inertia, are either predisposing or determining; under the former head, writers have enumerated, 1st, a plethoric and sanguine habit, a precocious and usually copious menstruation; more particularly where venesection has not been resorted to in anticipation, during the latter months of pregnancy; 2d, a lymphatic temperament; for those women who have a soft and lax fibre, or possess but little muscular power, and who are nervous and irritable, are more liable than others to this affection; 3d, the occurrence of a profuse flooding in former labours. We might bring forward numerous cases, all tending to prove the unfavorable influence of previous floodings; and, therefore, from the mere fact of their occurrence at one or more antecedent labours, the accoucheur ought to take suitable measures to prevent their reappearance.

Under the head of the so-called determining causes, we may classify: 1st, the exhaustion incident to a protracted and painful labour; or, in other words, all the obstacles that may oppose the child's natural delivery; 2d, a very short travail, and its rapid termination from the *stupor* of the walls, caused by the rude and hasty depletion of the organ; hence a very large pelvis, a laceration of the cervix and a want of resistance at the perineum, all which facilitate the child's rapid expulsion, may from that fact alone become the sources of inertia; 3d, an excessive distension of the womb, whether dependent on a dropsy of the amnios or a twin pregnancy, may paralyze, as it were, the contractility of the uterine tissue; 4th, according to Madame Lachapelle, we must further add the tension of the uterus, in consequence of an adhesion contracted

with the omentum during gestation; whereby the perfect retraction of the organ after labour is evidently impeded.

There can be no doubt that the various circumstances just alluded to, may of themselves give rise to inertia; but, as a general rule, their influence will be of short duration and easily set aside, if it is not favored by the existence of some predisposing cause. It is to the latter, especially, as M. Guillemot observes, that we must refer the chief part in the production of those hemorrhages that occur after the child is born. In fact, where they exist conjointly in the same woman, there is every reason to fear the occurrence of that accident; whilst, if absent, the supposed determining causes usually have but little or no effect.

The influence of those causes is ordinarily developed in the course of a few minutes after the child is born; though sometimes the inertia is secondary, as it were, not coming on for several hours, or even not until several days afterwards. The matrix, after having been properly retracted, subsequent to the escape of the child or after-birth, then becomes relaxed by degrees, and ultimately gives rise to a frightful hemorrhage.

B. Symptoms.—Where the uterus retracts properly as soon as the labour is over, a hard, globular, rounded tumor is found in the hypogastric region, occupying nearly all the space between the umbilicus and pubis. This tumor is the seat of intermittent pains of variable intensity, and it always exhibits a greater degree of hardness pending the duration of the latter. But an absence of these characters indicates an inertia of the organ; that is, by palpating the lower part of the abdomen, we find nothing but softness and flaccidity throughout; for the abdominal and uterine walls are so easily depressed, that they can be pushed back against the posterior ventral parietes; and, indeed, where the inertia is complete, it is even impossible to make out which are the uterine, and which the abdominal walls. Again, by carrying the hand up towards the womb, it readily passes through the relaxed cervix, and finds the uterine parietes everywhere flabby and wrinkled like a bit of old rag. Should the inertia be partial, the uterine structures seem to be thicker, and to have a more marked consistence; but they are still readily distended, and are far from offering their characteristic resistance.

This condition may exist without hemorrhage, if the placental adhesion still remains intact at every part of its uterine surface; but whenever a separation has occurred, a flooding is clearly inevitable. Of course, the latter will be the more copious as the detachment is nearly or wholly completed at the time the inertia is manifested.

The signs by which the existence of hemorrhage is recognized are easily made out; but the discharge is sometimes so sudden and profuse, that it is not detected until the woman's life is already seriously endangered. The patient generally complains of a feeling of weight about the stomach; and, soon after, a pallor of the face, dimness of vision, smallness of the pulse, weakness, syncope, and all the most alarming general symptoms are manifested. To these

are added some phenomena, peculiar to the uterine discharge; such as pains in the loins, a spasmodic chill, and a dragging sensation at the epigastrium (sometimes resembling that caused by hunger); and, in the latter moments, there not unfrequently comes on a hysterical attack, or even some convulsive movements. As regards the local signs, they are very variable; and hence, in this respect, the flooding has been characterized as the external and the internal. When it is external, the blood which inundates the patient's bed, soaks through the mattress, and trickles down on the floor, cannot possibly permit any mistake as to the cause of the general phenomena just indicated. But when it accumulates in the uterine cavity, the nature of those symptoms may escape detection, or at least, may only be recognized when it is too late to remedy them.

Every circumstance whatever that constitutes an obstacle to the ready discharge of the blood through the uterine orifice, may give rise to an internal hemorrhage: thus, a very considerable obliquity of the womb, in which the neck is carried high upwards and backwards; an occlusion of the os uteri, by a part or the whole of the placental mass, or by large coagula; the imperfect plugging up of the vagina by the tampon, or the closure of the vulva by cloths; and a spasmodic contraction of the os uteri (although, in cases of inertia, this retraction is seldom extensive enough, of itself, to obliterate the outlet), must necessarily favor the formation of a clot that could easily block up the already diminished cervix. Let us add further, that the elevated position in which the pelvis is designedly placed for the purpose of arresting an external discharge, may prove a cause of internal hemorrhage.

Whenever any obstacle prevents the escape of the blood, the latter accumulates within the uterine cavity, the walls of which readily yield to distension. If the hand be then placed on the belly, the womb will be found much enlarged, occasionally even attaining the height it had during the latter months of gestation; the ball, formed by the retracted organ, is no longer felt at the usual place, its volume has increased, but its hardness has decreased; the finger in the vagina finds the uterine orifice, which is carried far backwards or is spasmodically retracted, obstructed by the placenta, or by a clot; and, when passed up into the matrix, it detects there a large quantity of coagulated and fluid blood. (*C. Baudelocque.*)

c. *Diagnosis.*—It is scarcely possible to mistake the nature of the symptoms, when the hemorrhage is external; but this is far from being the case where the blood accumulates in the uterine cavity; for, although we have enumerated the general debility, syncope, etc. and the enlargement of the abdomen, as pathognomonic signs of flooding, yet these circumstances may all be met with and still there may be no hemorrhage.

The increased size of the belly may be owing to the fact that the intestines, after having been so long compressed by the developed organ, become expanded by the gas they contain; and thus cause the abdominal walls, which are still soft and flabby, to swell up nearly to their previous size. But any errors from this source will

be corrected by the clearness of the abdomen on percussion, by the vaginal examination, and by palpating the uterine globe.

"Sometimes," says Madame Lachapelle, "owing to the extensibility of the vagina, the womb is carried up by the distended bladder filled with urine, thereby singularly augmenting the size of the belly. In one instance that came under my notice, the pupils had become much alarmed by this circumstance; but I relieved their anxiety in a moment by the introduction of the catheter. For the prominence of the bladder, which is so easily recognized by an experienced person, satisfied me at once as to the nature of the case; and, besides, it was not accompanied by any of the general symptoms of flooding."

The accoucheur ought also to bear in mind that a syncope, occurring after childbirth, does not always depend on the loss of blood. It is not unfrequently observed shortly after very rapid labours; for then the womb being emptied at once, the compression to which the hypogastric vessels had been subjected during the latter months of gestation is suddenly removed; the circulation in them becomes free and unobstructed, and the rapid determination of the blood from the head and upper extremities, towards the vessels of the lower parts, often gives rise to fainting. When it occurs, the horizontal position and the application of a moderately drawn bandage around the belly, are usually sufficient to relieve the affection.

An hysterical attack, coming on immediately after the travail, might be mistaken for those nervous phenomena that so often signalize the unfavorable termination of grave hemorrhages.

But in all such cases, by resorting to the vaginal touch, and the palpation of the hypogastric region, the accoucheur will clearly ascertain the retraction of the organ; and, therefore, will not be likely to confound them with the symptoms dependent on an inertia of the womb.

D. Prognosis.—A flooding manifested after the travail is over, is an exceedingly dangerous accident; for a few minutes may decide the woman's fate. Of course, the discharge will be the more profuse as the inertia is more complete and the separation of the placenta more advanced. Other things being equal, an internal hemorrhage is more dangerous, as a general rule, than an external one; simply because it is more apt to escape detection.

Of the symptoms that are common to both varieties of flooding, there are some which more particularly indicate the imminency of the danger, and even a speedy death; such, for instance, as severe chills or convulsions, prolonged syncope, sharp and continued pains in the loins, together with vertigo and loss of vision.

"It should also be remarked that the pupil is usually dilated, that it is at times agitated by oscillatory movements, and that the dilatation is particularly evident when the syncope is most profound." (*Lachapelle.*)

E. Treatment.—The treatment of uterine hemorrhage from inertia is either preventive or curative.

The preventive treatment consists in breaking up the predispositions just alluded to, and in preventing the action of those causes which might determine an inertia of the womb after labour. In women of a full habit, whose menstrual discharges have usually been copious, and in whom plethoric phenomena become manifested during pregnancy, it would be proper to resort to repeated blood-lettings in the course of the latter months; and, even pending the travail, if the fullness of the pulse, headache, and flushing of the face, seem to require it. In those of a feeble and delicate constitution, who have suffered from flooding in their former labours, those measures calculated to arouse the contractility of the uterine tissue ought to be employed in the latter stages of parturition; that is, to stimulate the action of the uterus by external frictions and pressure, by the application of compresses soaked in some cold fluid acidulated with vinegar, over the belly, and more especially, by the exhibition of fifteen to thirty grains of ergot, divided into three doses, about twenty minutes or half an hour before the child is born.

Doctor Robert Lee (*London Med. Gaz.*, 1839, p. 713) recommends the following course, namely: to rupture the membranes at the commencement of the labour, in those women whose previous history would cause us to fear a profuse hemorrhage after the delivery; without waiting for the dilatation of the os uteri, or even for the development of strong pains; he then applies a bandage around the abdomen, and gradually tightens it as the travail advances. The subsequent progress is abandoned to nature; taking care to keep the apartment cool, and forbidding the employment of stimulants of any kind. I have, he says, several times adopted this plan with success.

There are still some other prophylactic measures of great value, when there is reason to suspect an inertia of the womb. For instance, the best way of modifying the action of the determining causes, is to retard the termination of a rapid labour as much as possible, particularly in women of a lax fibre and lymphatic temperament; but, on the other hand, to accelerate a long and painful travail by aiding the inefficient powers of nature before the patient is wholly exhausted, and before the womb falls into a state of atony. Doctor Clarke very properly advises the hand to be placed over the fundus during the child's delivery, with a view of affording it a support, both pending and after the contraction. Burns adds, that a moderate pressure on the abdomen after the delivery, proves beneficial in keeping up, and stimulating, the action of the organ.

"But," says Madame Lachapelle, "if, notwithstanding all your exertions, and notwithstanding the most perfect rest, and the express charge to the patient not to bear down, you find the accouchement progressing with a fearful rapidity, you still have one resource left, that is, to leave the placenta in the womb until fresh pains are excited. For, in most instances, this body is not entirely detached, and it resists the flooding so long as the stupor of the womb, caused by its too sudden evacuation, persists. In the opposite case, that is,

where the travail has been prolonged, the placenta is ordinarily separated from the uterine wall, at least, in a great measure; and hence it can no longer oppose the discharge of the blood. From that time its presence will only serve to keep up the feebleness of the uterus, and by irritating its walls, exhaust it without any benefit; you should therefore proceed at once to the delivery of the after-birth, free the matrix of it entirely, and take advantage of the little energy the latter still has remaining, to procure its proper retraction." (*Pratique des Accouchements*, t. ii.)

Curative Treatment.—There is one special indication presented after the child is born, namely, that of arousing the uterine contractions, which alone can put an end to the hemorrhage, as soon as possible. The means suggested for this purpose are exceedingly diversified, but we shall endeavor to illustrate their respective values.

Of all the various measures recommended for the flooding dependent on an inertia of the womb, the easiest and most certain is a direct irritation made simultaneously over the body, and on the neck of this organ, by placing the hand on the lower front part of the abdomen so as to rub, press, and squeeze the uterine wall; whilst at the same time two fingers are passed into the vagina to irritate and titillate the os uteri. If these do not effect the object, the whole hand is to be carried up into the cavity of the organ, with a view of irritating and stimulating its internal surface with the fingers, the other hand keeping up the frictions on the hypogastrium in the mean while. The operator is sometimes obliged to compress and knead the organ, as it were, by bearing strongly on the abdominal surface, while the hand in the cavity serves as a *point d'appui*.

This measure is preferable to all others, because it can always be resorted to without alarming the patient, and is not likely to bring on an inflammation of the organ, as happens from most of the astringent and stimulant articles advised by some writers. The injection of rectified alcohol, or of oil of turpentine, spirit of vitriol, etc., into the uterine cavity, which has been recommended by Pasta to be used in such cases as a caustic, ought to be banished from practice. Even the employment of strong vinegar requires the exercise of much discretion.

Should the irritation made by the hands prove insufficient to rouse the contractility of the uterine tissue, we must resort to an application of cold, which acts both as a sedative to the circulatory system, and as an astringent on the muscular fibres. Compresses dipped in iced water are to be applied over the lower part of the abdomen, the genital organs, and upper portion of the thighs; and a quantity of cold water might be injected into the vagina at the same time, taking care to pass the extremity of the canula into the uterine cavity. In a serious case, the example of M. Evrat might be advantageously followed; this gentleman carried a peeled lemon up into the womb, and then expressed its juice with his hand, so that the citric acid, by coming into contact with all parts of the internal surface, would stimulate the organic contractility. Or that of M. Desgranges, by

introducing a sponge dipped in vinegar, then squeezing out the fluid, and abandoning it in the uterine cavity; having previously taken the precaution of passing a little cord through it, by which it can easily be withdrawn, when deemed advisable.

Again, some persons have suggested that a piece of ice be passed up and left for a few moments in contact with the uterine surface. But, the employment of this measure, as well as the external application of cold, must not be persisted in too long; because, as Madame Lachapelle has judiciously remarked, the prolonged application of snow, ice, cold irrigations, douches, and sponging with very cold water, that has been so much vaunted by some authors, is not unattended by danger to the patient; and, therefore, the use of cold ought to be restricted within moderate limits. Most generally, it becomes ineffectual in the course of five or six minutes; often, indeed, it proves positively injurious, either by reducing the woman to a state of mortal torpor, or by exposing her to a violent inflammatory reaction.

There are some cases of obstinate hemorrhage, in which all the measures yet spoken of prove ineffectual. For such cases other remedies have been recommended, which now claim our attention. These are the tampon, the introduction of a bladder into the womb, the approximation of the uterine walls by immediate pressure, the compression of the aorta, the ergot, the use of opium and transfusion.

1. *The Tampon.*—Leroux reports quite a number of cases of inertia of the womb, in which the tampon arrested the flooding, where it seemed to be inevitably fatal. But, as Desormeaux remarks, it often happens that men, even those who are otherwise worthy of credence, are often more successful with remedies of their own invention, than any one else. In fact, the only effect of the tampon in many cases is to convert an external into an internal discharge. In order to obviate this disadvantage, it has been suggested to combine its employment with the compression of the uterine walls by means of the hands. M. Chevreul, who is favorable to its use after the accouchement, adds that it is necessary to irritate the organ externally as much as possible. But in the cases mentioned, both by him and Leroux, where the tampon was apparently successful, it was not, as M. Baudelocque avers, so much in preventing the discharge of blood, and determining its coagulation, as by irritating the internal surface of the womb, and thereby producing a retraction of its vessels, that the plug could have had a salutary effect. The tampon itself, or rather the irritating substances M. Chevreul saturates it with, conjoined with external stimulation, may indeed bring on the contraction in many cases; but the mere plugging up of the vagina, as directed by Leroux, is useless, to say the least; and therefore the introduction of some old linen, steeped in vinegar, into the uterine cavity, is in reality the only efficacious part of the plan; but even this will prove still more beneficial when accompanied by a compression of the hypogastrium, and by frictions and stimulations of the organ above the pubis.

2. The introduction of a hog's bladder, which has been softened

by holding it a short time in warm water into the matrix, is even a worse measure than the preceding; and it is really astonishing that Gardien seems to be in favor of its employment. The presence of such a bladder must evidently be a continual obstacle to the womb's retraction. A great stress has been laid upon the compression, which it might make on the vascular orifices, but to no purpose: for, even were this a constant result, which however is far from being the case, since we are never sure of filling the uterine cavity precisely, the difficulty would only be delayed, as the hemorrhage might reappear as soon as the bladder is withdrawn; and then, after all, we should have to fall back on the retraction of the organ.

3. M. Deneux conceived the happy idea of pressing the uterine walls together, in a desperate case, by means of a folded napkin, which he applied over the hypogastrium, and retained in position by a tight body-bandage; this arrested the discharge of the blood completely. Notwithstanding M. Baudelocque has accorded the original suggestion of this plan to M. Deneux, it was long since recommended, particularly by the English writers. This procedure has been unjustly censured by certain practitioners, since it certainly may prove very useful in an extreme case. In saying that, from the disposition of the posterior line of the trunk, the uterine walls can only be brought into contact with each other at the point corresponding to the sacro-vertebral angle, Madame Boivin has evidently confounded the bare skeleton with the one still covered by its soft parts.

4. Quite recently, M. D'Ornellas has defended a thesis on the compression of the aorta as a remedy in uterine discharges, and he brings forward numerous cases in support of his theory. M. Baudelocque has assured me that he has several times succeeded in arresting a flooding in this way, which threatened an early fatal termination. This gentleman, who disputes with Dr. Trehan the honor of its revival, appears to have great confidence in the efficacy of the measure; and we may add that a very great number of facts now militate in favor of his opinion. He recommends the compression to be made in the following manner: first, flex the patient's superior and inferior parts on the pelvis; then depress the abdominal wall immediately above the fundus of the womb with the four fingers of one hand, when the pulsations of the aorta will be more distinctly felt than the beating of the radial artery. The compression may be kept up for a considerable time without causing any particular inconvenience to the woman; M. Baudelocque states that he has persisted in it for more than four hours. This compression, however, is only considered, even by its author himself, as a mode of gaining time; for he administers the ergot almost immediately, by the action of which the uterine contraction is soon established. The compression of the aorta, though long since recommended, had been generally proscribed because the modes of effecting it were very imperfect. Thus, some directed the pressure to be made through the ventral surface and the double uterine wall; while others introduced the hand into the cavity of the uterus, and

then subjected the vessel to pressure through the posterior wall of this organ. But both of these modes ought to be rejected, because they impede the retraction of the womb.

5. The *ergot* has been recommended, as stated above, as one of the measures calculated to prevent the occurrence of hemorrhage in women who, by their constitution and previous history, seem to be highly predisposed to it. This remedy may also be resorted to in the curative treatment; but, unfortunately, the time necessary for procuring it, and for the development of its action, is always too long to secure a sufficiently prompt effect; and hence, in an alarming hemorrhage, one dependent on a complete inertia of the womb, for example, the patient would certainly die before any benefit could be hoped from its employment. Under such circumstances, it would prove highly useful to compress the aorta in the mean while. But, with the exception of these frightful cases, where a few minutes decide the woman's fate, the *secale cornutum* ought to be employed; and its use would be nearly always followed by success.

In some females, the uterine hemorrhages have a marked tendency to relapse. Consequently, a few grains of this substance ought to be administered as soon as it has occurred, whether it seems to be finally arrested or not. For, in the former case, it can do no harm, and, in the latter, it will prevent a return of even a partial inertia; which is not an indifferent matter to a woman who is already exhausted from the previous loss, and who is liable to succumb under a fresh discharge, however inconsiderable it may be.

6. The English authors (Burns, and others) recommend the use of opium in full doses, both as a preventive and a curative remedy in cases of flooding from inertia. They bring forward some cases in support of their opinion; but I do not deem them conclusive; because, in every instance, they combine the exhibition of opium with the employment of those general measures just indicated as proper for arresting hemorrhage. Besides, I cannot understand how opium, when administered alone, can have any influence whatever over the retraction of the uterus, which is here the only hope of safety.

7. The *transfusion*, which has been so highly praised by certain English writers, in whose hands it seems to have succeeded quite a number of times, has not been followed by the same success in France. This is one of those extreme measures which might be employed in desperate cases, though it cannot be relied upon; because the extent of the flooding, the patient's extreme debility, and the slowness of its operation, generally render it ineffectual; without referring to the nervous and inflammatory symptoms, and the phlebitis, which very frequently succeed the operation. I once saw it performed at the *Hôtel-Dieu* without any benefit whatever. In some of the reported cases, a notable improvement was effected by a moderate quantity of blood (three or four ounces); in others, it was necessary to inject as high as ten, and even as high as thirteen ounces.

8. An inertia of the womb, and the consequent hemorrhage, often

come on before the delivery of the after-birth; and the retention of the placenta here presents some special indications which are important to be known. Whenever a hemorrhage takes place, a more or less considerable portion of the placenta must evidently be detached; sometimes, even, it is wholly separated from the uterine wall, being left free and movable in the cavity of the organ. The directions given by authors in this case are very variable: thus, some advise us to extract the secundines at once, together with any coagula the uterine cavity may contain; others, on the contrary, to try first to remedy the inertia, which is the sole cause of the accident. We do not hesitate to recommend the latter advice; because, if the placenta is partially removed, we would certainly augment the sources of hemorrhage by completing its separation; and even where it is entirely free, by emptying the womb we create a larger space for the effused blood; of course, in either case, facilitating the hemorrhage. Hence we look upon it as an absolute rule not to attempt the extraction, and more particularly the detachment of the placenta, until the accoucheur, by stimulating and irritating the organ with his hand, has secured its diminution and contraction to such an extent, that it drives, as it were, the coagula and after-birth beyond his hand.

Should the adhesions of the placenta be unusually firm, the injections into the umbilical vein, spoken of in the last chapter, might be resorted to.

When the physician has been fortunate enough to overcome the hemorrhage, by a resort to the various measures just alluded to, he should still continue with his patient for several hours, carefully watching the character and amount of the discharge from the vulva, and occasionally placing a hand over the hypogastrium, so as to detect any increase of volume in the uterine globe. He ought also to take the precaution of applying cloths steeped in vinegar, or alcohol, or even in cold water, over the belly, and to retain them there by a moderately-drawn body-bandage; absolute quiet is to be insisted on. As nourishment, the patient might have some light cordial, broth, sweetened wine, etc. etc.

After a profuse hemorrhage, the patient is naturally inclined to sleep; some persons think it better to prevent her from slumbering, lest the discharge be renewed without her knowledge. But, as this repose repairs the exhausted forces, it ought not to be hindered; but she must never be left; for the pulse, the uterus, and the vaginal discharge require a constant oversight.

The patients are frequently tormented, after considerable floodings, by vomiting, or at least by sick stomach, nausea, and retchings. Independently of the pain they occasion, these gastric symptoms are not wholly devoid of danger; for the vomiting, from the fatigue, caused by the strainings to which the woman gives way, may produce a syncope, during which the hemorrhagic discharge may be renewed in profusion. If there are only the nausea and inclination to vomit, the women are often so tormented thereby as to wear out the little strength they have left; and this exhaustion of the mus-

cular power, at a time when the uterine contraction is so necessary, is a very melancholy condition. "Nothing tranquillizes the stomach under these circumstances," says Dewees, "so far as I have observed, like opium, in the solid form. A newly prepared pill of two grains of the opium, with a very small portion of soap, to facilitate its solution in the stomach, should be given every hour or two, until the vomiting ceases, or the stomach becomes reconciled. I have found a sinapis over the region of the stomach of great service, and it should be resorted to, if necessary."

In order to complete my remarks on the hemorrhages that occur after the accouchement, I have yet to say a few words concerning two of its causes, which thus far have not been alluded to.

Active Hemorrhage.—Under this name, Madame Lachapelle has described a flooding, which comes on sometime subsequent to the parturition; and which is produced, as she supposes, under the influence of a peculiar *molimen hemorrhagicum*. This variety is occasionally developed even without any inertia of the womb. "We have known," she continues, "a woman to perish seven or eight days after her confinement, from a profuse discharge of serous blood, which transuded from all parts of the utero-vaginal surface, and saturated, by imbibition, the most solid tampon; the womb was soft, but not distended with the blood." I have twice known a hemorrhage to take place after the delivery of the after-birth, says M. Velpau, although the womb had been contracted in the one case for four and in the other for seven hours. He further states that this accident is occasionally manifested subsequent to the first twenty-four hours.

This molimen is often occasioned by the retention of a part of the placenta, or of some large coagula, whose presence irritates and determines a considerable sanguineous fluxion towards the uterine walls.

The extraction of the foreign body in the latter case, generally dissipates the symptoms; in the former, a resort to the revulsives, to cold applications, and even to venesection, is evidently indicated. These will be materially aided by a regulated diet, and absolute rest in the horizontal position.

Hemorrhage from the Umbilical Cord.—In the twin pregnancies, a hemorrhage may take place from the cut placental extremity of the cord, after the first child is born. For, although no vascular communication habitually exists between the two placentas, yet the contrary has been too often observed to leave any doubt with regard to the fact at the present day; and hence it is admitted by most practitioners. Besides, we find cases recorded by Mery, Baudelocque, and Solayres, which fully prove that, even in single pregnancies, a hemorrhage profuse enough to endanger the mother's life, may occur after the division of the cord; as also, that the umbilical vein is the sole source of this discharge. "As regards the bleeding from the placental end of the cord, other than in cases of twins, I can aver," says M. Chevreul, "having observed it three times in women whom I had delivered with the forceps; having cut the cord in a

hurry without applying any ligature, the blood continued to flow abundantly from that portion connected with the placenta, whilst I was devoting the necessary attentions to the child. I resorted to all the modes of irritation advised in such cases, for the purpose of rousing the contractions; but the discharge was only arrested by tying the cord. The delivery of the after-birth shortly occurred, and was followed by no untoward accident." Quite recently, M. Guillemot has met with a very similar case.

By reflecting on the mode of vascular connection heretofore studied in the placenta, it really seems impossible to understand how the mother's blood, in a natural condition of things, can pass into the ramifications of the umbilical vein, and thence escape in such vast profusion. But are we on that account to reject such facts, advanced by experienced men of high standing? I think not; besides, the explanation would be rendered very intelligible by supposing some vascular anomaly in these exceptional cases. I therefore consider a hemorrhage possible from the placental extremity of the cord, for I cannot question the testimony of the imposing authorities just quoted. Under such circumstances, a ligature of the cord is evidently the only resource.

§ 2. OF INVERSION OF THE WOMB.

This is an affection in which the fundus of the organ, being indented or depressed, is more or less inverted into its cavity, or even passes down through the os uteri into the vagina, or out at the vulva.

The inversion of the womb exhibits many different degrees; from a simple depression of the fundus to a complete inversion, where the organ is turned inside out, the internal or mucous surface becoming the external one, and *vice versa*. For the purposes of description, we shall admit three principal degrees: in the first of which the fundus is simply depressed, approaching to, but not engaging in, the os uteri; the second is a partial inversion, where the fundus actually engages in the orifice, and protrudes into the vagina; and the third is a complete inversion, in which the uterus is turned inside out, appearing at the vulva, or even protruding beyond it.

1. When the depression commences at the fundus, this portion forms a tumor above the pubis, a kind of tail-piece, having its highest borders nearer to the pubis than the sacrum; or it may commence at the sides; and where it is the front one that is indented, the posterior border is higher than the anterior, but where the reverse happens, the posterior is the lower: again, when it is depressed laterally, the top of the womb is inclined towards one of the iliac fossæ. If the placenta is still undetached, the indentation is augmented by pulling on the umbilical cord. Finally, when the finger is passed into the cavity of the womb, it finds the fundus within half an inch, more or less, of the orifice.

2. Where the inversion is partial, we can detect a hemispherical tumor by the vaginal examination, varying in its size, according to

whether the placenta is detached or is still adherent; the neck of the womb encircles this tumor at its upper part like a collar. The ball usually formed in the hypogastric region by the uterine globe, is no longer felt on palpation; a considerable depression being found in its place.

3. Where it is complete, the tumor may either fill up the vagina without passing beyond the vulva, or it may hang down between the woman's thighs. In the former case, the whole vaginal cavity is occupied by a voluminous tumor, the upper part of which can scarcely be reached; in the latter, which is the most serious of all, the pelvic cavity is altogether empty, and nothing can be felt there by the hand; but a large tumor is found between the patient's thighs, having the placenta attached, in whole or in part. The summit of this enlargement is either concealed between the labia, or it extends up into the vagina. In some instances, the latter has also been implicated in the displacement, and has been inverted in a great measure, thereby giving a considerable length to the tumor. "We cannot, however, say that the inversion is strictly complete," says Burns, "for, in most cases, the lips of the os uteri hang down, and the inversion terminates at the lower part of the cervix." Some writers assert, notwithstanding, that the lips may be completely inverted.

This accident is always accompanied by some general phenomena, which are the more serious as it is the more considerable. The patient not only suffers from pain, but she is harassed by a constant desire to urinate, and by strainings at the close-stool, which are often sufficient to render an inversion complete, that would otherwise have only been partial. The pain becomes excruciating, and the frightened sufferer falls into a state of syncope; the pulse is feeble, and sometimes it is nearly or quite imperceptible. The intensity of these general phenomena varies with the state of retraction or relaxation of the cervix, and with the degree of inversion. For instance, it is much less in a simple depression, than where the inversion is more complete. Furthermore, the pains and dangers are much greater in the latter case, if the cervix uteri is firmly contracted, than where it is dilatable. Again, should the placenta be partially detached at the time of the accident, there will be a profuse hemorrhage; but, on the contrary, where it is firmly adherent throughout, no discharge occurs, since the latter only begins with the separation of the after-birth, and increases as this progresses. Lastly, where the inversion is complicated by inertia, which unfortunately is too often the case, the flooding is frightful, and it can only be moderated by a retraction of the womb.

The inversion is most generally produced by attempting to effect the delivery of the after-birth before it is entirely separated, by pulling imprudently on the cord. It may also result from a very rapid labour, more particularly if the woman happens to be standing at the time when the child is born; for if the umbilical cord is unusually short, or is wound around some part of the infant, the

fundus may be pulled down by the strain on the cord, and thus become inverted.

An inversion from this latter cause is far more unusual than one would suppose; because the cord is generally broken under such circumstances, incomprehensible as the fact may seem, when we reflect on the amount of force required to rupture it. The rarity of the inversion, however, is more readily explained by the powerful contraction at the instant the foetus is expelled, and by the difference in the line of axis of the two straits; the axis of the superior strait forming nearly a right angle with that of the inferior one, or rather with that of the vulva. In other words, the cord passes around the posterior part of the symphysis pubis, as over a pulley; and, therefore, the greater amount of the tractive force is spent on the symphysis before reaching the fundus.

It may happen, from the uterus being in a momentary state of inertia after delivery, that the pressure made by the intestinal mass indents its fundus like the bottom of a bottle. Again, in cases of complete inertia, should the placenta be attached directly to the vault of the organ, its weight alone might pull down the fundus. Such accidents are usually corrected by the force of the contractions; though, should the operator pull on the cord before noticing the depression, he might increase the difficulty by converting it into a partial inversion.*

When a simple depression occurs immediately after labour, it will scarcely attract attention, unless the placenta happens to be detached, and a hemorrhage is thereby developed. It ought to be reduced, as soon as detected, by placing the patient on her back, and having the abdomen and breech raised higher than the chest; the legs and thighs are flexed and held apart, and the head is inclined forwards on the breast; then the operator carries his hand into the uterine cavity, and gently pushes out the fundus with his fingers.

* Although I am only treating of uterine inversion here, as a complication of the delivery, I cannot refrain from mentioning a very curious case, narrated by Ané, at *l'Ancienne Société de Médecine*, of a woman who had a complete inversion of the womb twelve days after her confinement, which resulted in consequence of severe strainings at stool. This case, which was confirmed by Baudelocque, who was called in consultation, can leave no doubt as to the possibility of such an accident, however extraordinary it may appear. I will further add that the observations of Sabatier would seem to prove that such an inversion may not only take place when the fundus of the womb is depressed by a polypus, but also in a state of perfect vacuity.

M. Roussel communicated a case to M. Martin, in which the inversion did not take place until nine hours after the delivery. The patient had a frightful flooding at the time of the placenta's extraction, which M. Roussel arrested by the ordinary measures; after which, he remained with her until fully satisfied of the womb's retraction. It was then about eight o'clock in the evening. At five the next morning, he was summoned in great haste; when it appeared that the patient had got up to evacuate her bowels, and the womb immediately fell down to the vulva. On his arrival she was senseless, and the pulse imperceptible; the finger, passed into the vagina, found there a large tumor, formed by the inverted fundus, around which the os uteri had firmly contracted, and doubtless had thus contributed to the diminution of the hemorrhage.

M. Chevreul sums up so well the indications presented by the partial and complete inversions of the womb, with reference to the delivery of the after-birth, that I cannot do better than transcribe here his remarks on this subject. He says, "a partial inversion is easily reduced when detected shortly after its occurrence. Of course, the placenta may either be separated wholly or in part, or it may be still adherent throughout to the womb, at the time of the accident. If wholly detached, the hemorrhage is very profuse, and requires immediate attention. The accident is remedied by placing the woman in a suitable position, and then, introducing the whole hand into the vagina, the fingers take hold of the inverted portion of the matrix and endeavor to return it, by first pushing up the part that came down last. Should the placenta be partially detached, and the remaining adhesions be feeble, its separation ought to be entirely completed, by passing the fingers between it and the uterine wall; after which, the reduction is to be effected as in the former case. But if it is still adherent throughout, the whole is to be returned together; and then we may either wait for the spontaneous delivery of the after-birth, or we may attempt to separate it by the hand, according to circumstances."

Where the inversion has existed for several hours, it occasionally happens that the protruding portion of the matrix is strangulated, as it were, by the os uteri, which constitutes a serious obstacle to its reduction. Under such circumstances, it is not advisable to use forcible attempts to surmount the difficulty, lest some serious accident might result; but rather to have recourse to venesection, to tepid bathing, to fomentations with the ointment or the extract of belladonna, and opiates; in a word, to all the means likely to relieve the constriction of the os uteri, and to moderate the force of the inflammatory symptoms. After these precautionary measures, the reduction might again be tried; but, if still unsuccessful, the patient will have to endure this disgusting infirmity for the remainder of her days.*

Where the inversion is complete, and the placenta is detached, we must first apply a soft and dry napkin upon the tumor, and then, having brought the fingers together in the form of a cone, depress its central part with their points, so as to make the fundus and body of this viscous gradually pass up through its orifice, and thus regain its primitive position; withdrawing the napkin as soon as the reduction is effected. Should the placenta be partially detached,

* However, two cases are reported, the one by M. Delabarre (*Acc. de Chir.*), and the other by Baudelocque, which fully prove that a spontaneous reduction of the womb may take place, even after it has been completely inverted for a long time.

M. Daillies endeavors to explain this natural reduction, in his excellent thesis, by the tonicity of the Fallopian tubes, and of the round and broad ligaments; which, after having been drawn down, at the moment of the accident, will necessarily return to their proper position in the course of time; and thus, by acting on the organ that involved them in its descent, will gradually elevate and return it to its original position.

its separation is first completed, and then the operation is terminated in the same way.

Again, if the adhesions are very extensive, or if they exist throughout, we ought to attempt the reduction of all together, by proceeding as in the first case, excepting in the use of the napkin; but, if the orifice is not dilated enough to permit the womb to pass through with the placenta, it would be necessary to separate the latter, and then reduce the former as promptly as possible.

Whatever be the degree of inversion, the hand is always to be kept in the matrix for some time after the reduction, for the purpose of preventing a return of the accident, and for soliciting the organ's retraction. The inertia, if any, must be remedied by the appropriate measures.

It is found by experience that whenever an inversion has occurred in a former labour, it has a tendency to be renewed at the subsequent ones. Consequently, no tractions on the umbilical cord, with a view of extracting the placenta, should ever be resorted to in women who have previously suffered from this accident. In cases of this kind, many practitioners prefer the introduction of the hand into the uterine cavity, so as to act directly on the placenta itself.

Such patients ought to be advised to remain in bed for a long time after their confinement; and, by the use of mild laxatives, to obviate the necessity of strainings at stool.

For the proper course to be pursued in cases of puerperal convulsions, we refer the reader to the special articles on that subject. (*Vide Accidental Dystocia.*)

§ 3. RUPTURE OF THE WOMB.

A rupture of the uterus is one of the most terrible accidents that can be developed in the course of pregnancy or parturition. But as it only claims our attention here, with reference to the difficulties it may create in the delivery of the after-birth, we shall not revert to the minute detail already given in the fourth part of this work. Several different conditions may here be met with; as, for instance, the child, having partially or wholly escaped into the peritoneal cavity, has permitted the organ to retract; and this retraction of its walls may have driven the placenta into the vagina, and then beyond the vulva;* or the placenta may remain adherent to the internal surface of the womb; or again, it as well as the foetus may have passed entirely into the cavity of the abdomen. In the former case there is evidently nothing to be done. In the second, if gastrotomy is resorted to, and it is found impossible to withdraw the placenta through the double wound in the abdomen and matrix, owing to the closure of the lips of the uterine rupture, it would be advisable to cut the cord as soon as the child is extracted; and then, by means of some long, solid, and flexible instrument, to bring down the cord

* This spontaneous expulsion may take place either immediately after the accident, or not for several days; as occurred in the case reported by Saucerotte. (*Mélanges de Chirurgie*, t. ii. page 295.)

through the rupture, the cervix, and the vagina, and out at the vulva ; after which the delivery of the placenta is to be effected in the usual way. In the third case, where the after-birth has passed into the peritoneal cavity along with the foetus, it ought to be extracted immediately after the latter ; either by the natural passages, if the child is removed in that way, or through the abdominal incision, if a resort to gastrotomy be deemed necessary.

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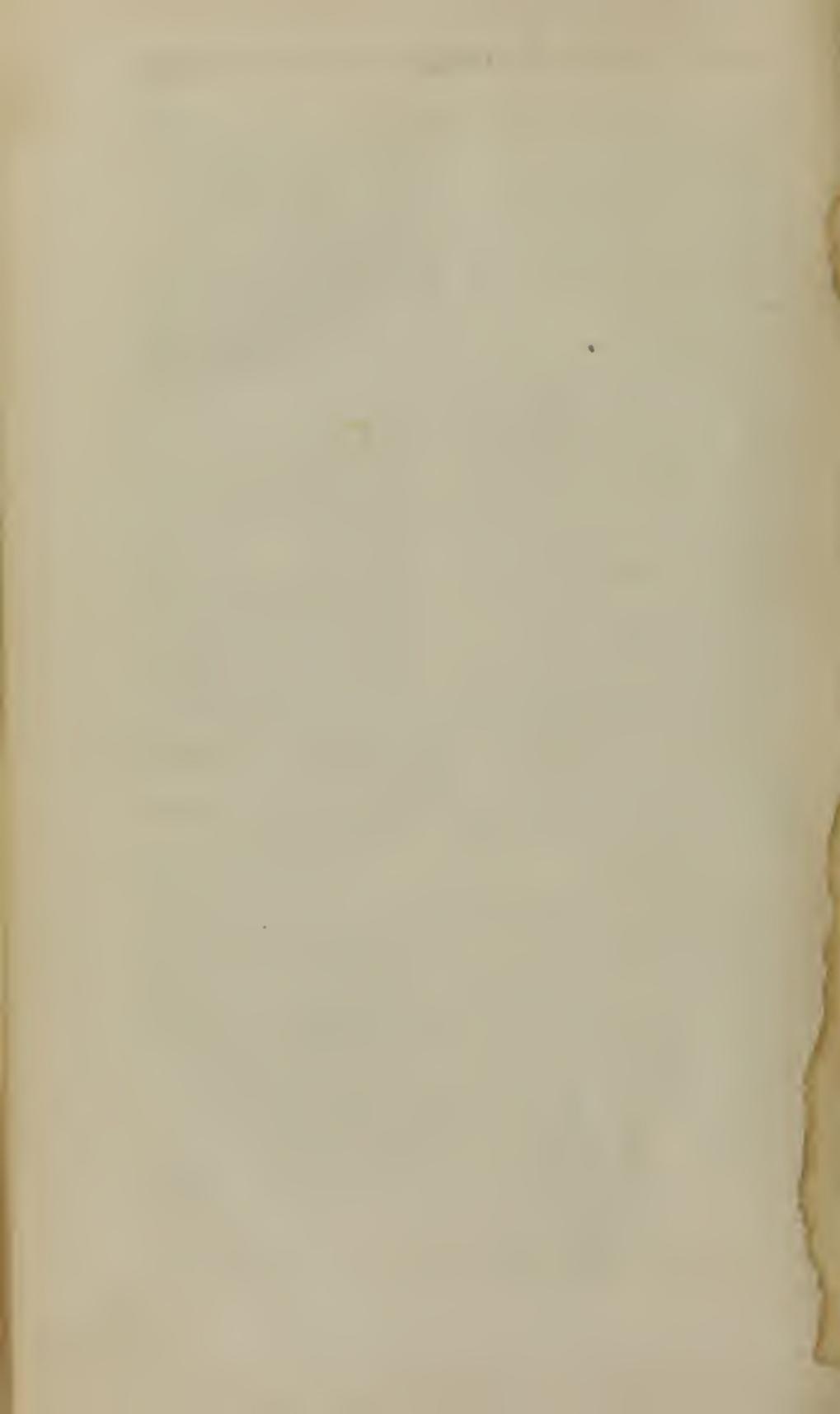
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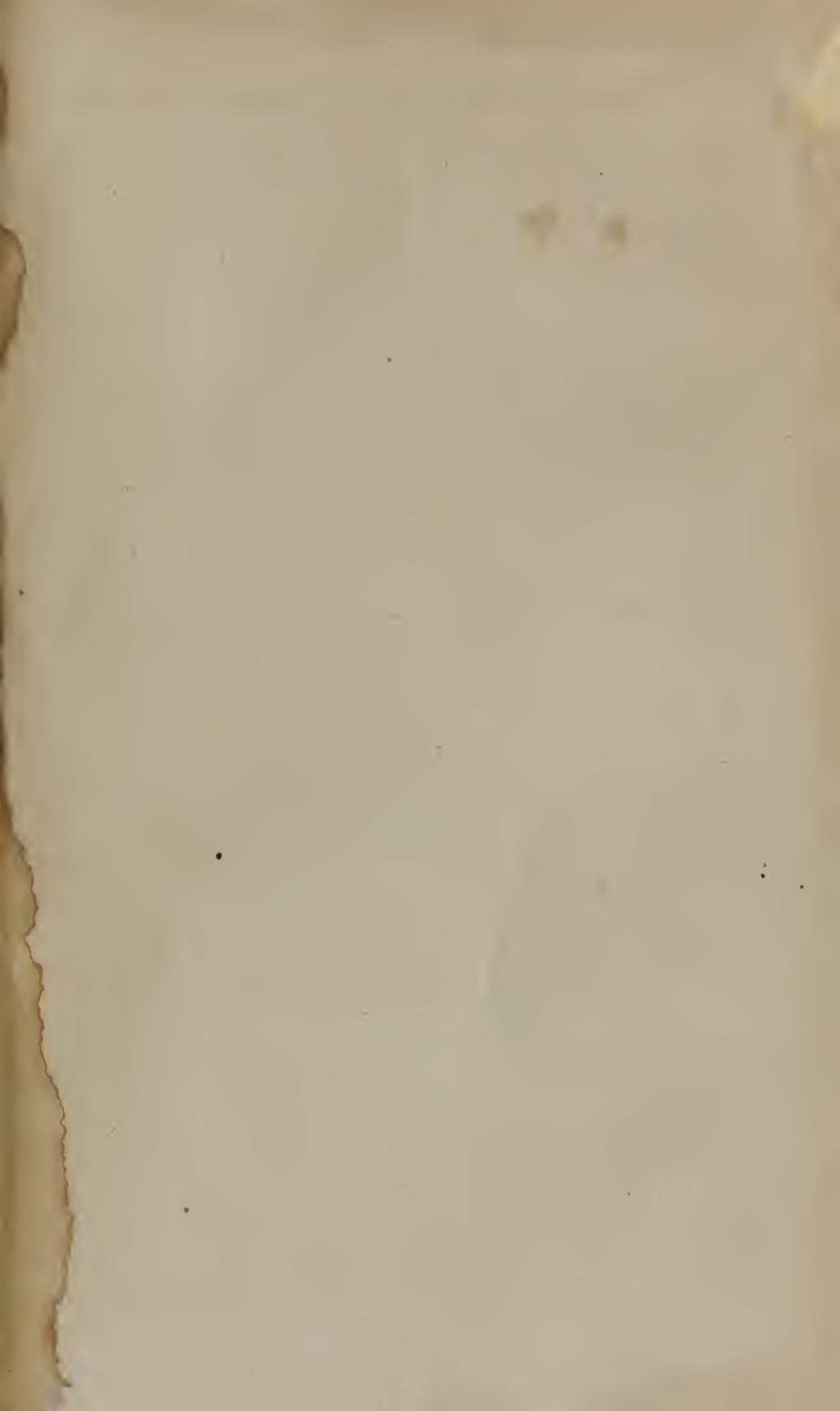
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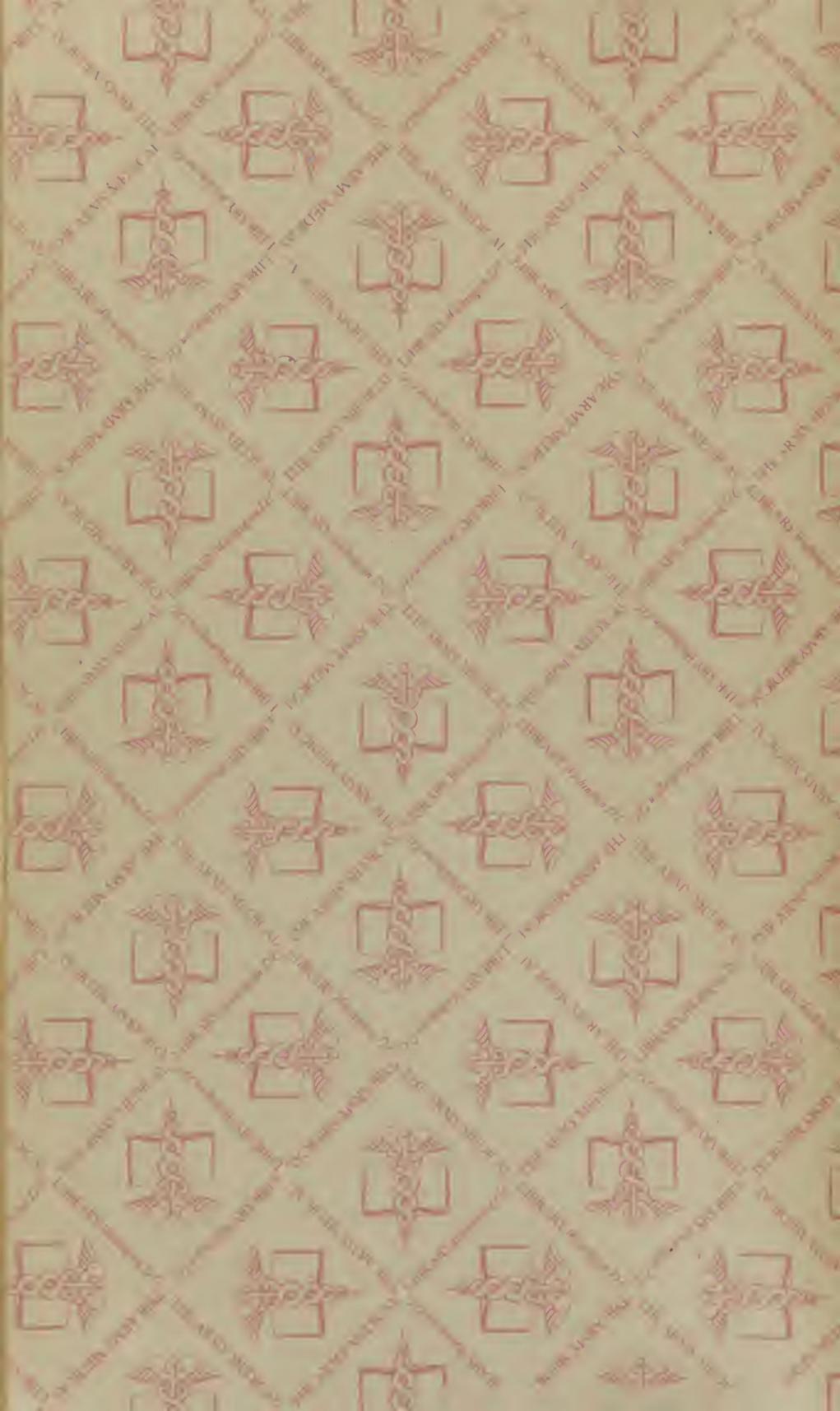
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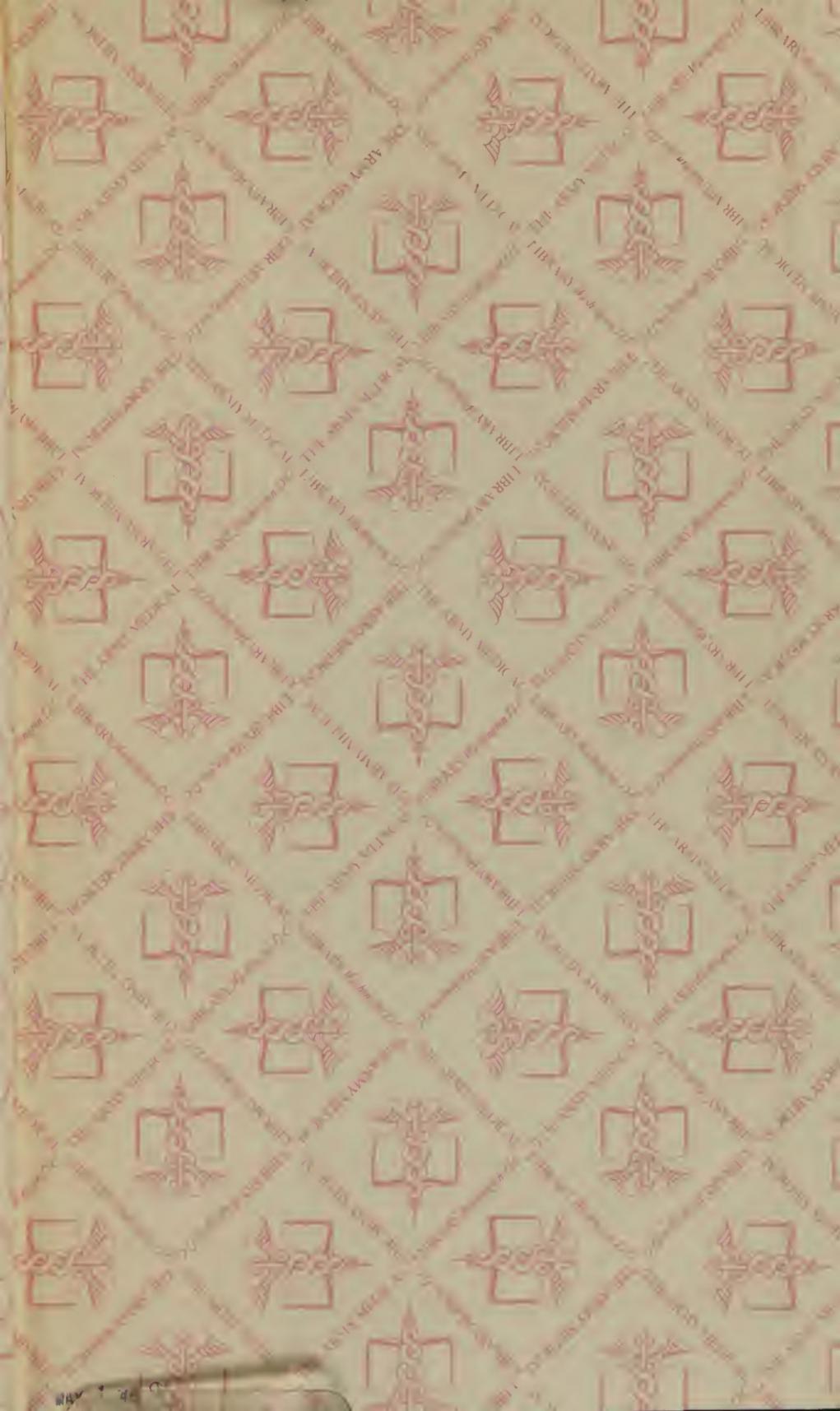
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